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STUDIES IN NEW WORLD MORACEAE: TROPHIS, CLARISIA, ACANTHINOPHYLLUM*

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ABSTRACT

This study includes revisions of three New World genera of the family Moraceae which have often been mistaken for one another. Two have been considered synonymous. *Trophis*, has never been the subject of monographic study, but *Clarisia* and *Acanthinophyllum* were revised by Lanjouw in 1936, who treated them as a single genus. In herbaria, critical specimens of one genus have frequently been filed with those of one of the other genera, and new species have occasionally been assigned to the wrong genus. Studying the genera together has permitted a consideration of their relationships and made available misplaced collections.

The revisions are based upon the study of herbarium specimens from seventeen important herbaria of the world. These collections include most of the type specimens of the species, subspecies, and varieties treated.

The study includes discussions of the important morphological characteristics of the genera; relationships of the genera are also briefly discussed. The genus *Sorocea* is included in the discussions.

Four species are recognized in the genus *Trophis*. *Clarisia* and *Acanthinophyllum* are treated as separate genera, each with two species. The subspecies of *T. racemosa* and *C. biflora* and the species of *Acanthinophyllum* are new combinations. WILLIAM C. BURGER, Imperial Ethiopian College, Box 138, Dire Dawa, Ethiopia.

INTRODUCTION

This study originally included a revision of the genus *Sorocea*. Only after material had been received from a number of herbaria and the study was well under way did I come to know that Professor J. Lanjouw had been studying *Sorocea* for many years. In July 1961 I had the good fortune of meeting Professor Lanjouw and his assistant Mr. Wessels Boer while visiting Utrecht. There we discussed *Sorocea* and found that our delimitation of species was very similar. We hope to publish a revision jointly in the near future. *Sorocea* is discussed in the following pages and included in a key to the genera.

The genera considered in this study are distinguished from most other dioecious New World Moraceae by their racemose, spicate, or occasionally capitate inflorescences. The pistillate perianth, with rare exceptions, is fused and tubular, while the alternate leaves are distichous and pinnately veined on unarmed branches. *Trophis* has never been monographed, but *Clarisia* and *Acanthinophyllum* were revised by Lanjouw in 1936. The vegetative resemblance and similar flowers and inflorescences of these genera have resulted in numerous misidentifications. Fre-

* Part of an investigation carried out in the graduate laboratory of the Henry Shaw School of Botany of Washington University and submitted as a thesis in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

quently critical specimens of one genus have been filed with those of one of the other genera, and new species have occasionally been assigned to the wrong genus. Thus, *Trophis macrostachya*, and nearly all the specimens which were referred to it, belong with *Sorocea*. Lanjouw concluded that *Clarisia* and *Acanthinophyllum* are congeneric and it has been suggested more recently (Woodson, 1960, p. 114) that *Trophis* and *Sorocea* might be congeneric. Studying the genera together has permitted a consideration of their relationships and made available misplaced collections which would not have been possible had only one genus been studied.

INFLORESCENCES

The staminate inflorescences are racemose or spicate, or condensed into small capitula in several species of *Sorocea*. These inflorescences are most commonly paired in the axils of leaves. In *Trophis* there is a reduction to solitary inflorescences in *T. chiapensis*. The spikes of *Clarisia* and *Acanthinophyllum* are especially interesting in that the stamens arise directly from the rachis and the tetramerous organization of tepals and stamens has been lost. The most elaborate type of inflorescence found among the genera studied is that of *Clarisia racemosa*. These "racemes" of staminate spikes are interpreted as leafless flowering shoots and are discussed in more detail under the special remarks on that genus.

The pistillate inflorescences parallel the staminate in *Trophis* and *Sorocea*. The pistillate flowers of *Clarisia* may be the result of a similar reduction. The peltate bracts at the base of the receptacle and the paired, axillary flowers of *C. biflora* may be interpreted as evidence for such a reduction. As in the staminate spikes the development of leafless flowering shoots has apparently resulted in the elongate pistillate "racemes" of *C. racemosa*. The pistillate capitula of *Acanthinophyllum* resemble those found in some species of *Sorocea* but are distinguished by the unciniate trichomes of the peduncle and the paucity of bracts subtending the flowers.

The nature and origin of the spikes and racemes, characteristic of the genera under consideration, remain hypothetical. Bernbeck (1932), in an important morphological study, concluded that the inflorescences of Urticaceae and Moraceae are basically cymose. The spikes and racemes that I have seen are noteworthy in usually lacking flowers along one or sometimes two sides of the inflorescence and thus simulating helicoid cymes. This is similar to the inflorescences of *Myriocarpa cordifolia* and *Urtica membranacea* studied by Bernbeck and interpreted by him to be derived from a cymose type. While Bernbeck did not study Moraceae with inflorescences of the type found in the genera under discussion, it seems safe to assume that they, too, arose from a cymose type.

STAMINATE FLOWERS

The staminate flowers fall into two categories: those that are definitely organized and tetramerous and those where the organization has been lost and the flowers are reduced to single stamens. The tetramerous flowers are readily distinguishable in *Trophis* and *Sorocea*. The stamens are inflexed before anthesis and the perianth is valvate in aestivation in *Trophis*, while the stamens are straight and

the perianth is decussate-imbricate in *Sorocea*. Dehiscence of the anthers is introrse in *Trophis*, but is usually extrorse in *Sorocea*; a pistillode is always present in *Trophis*, but is rare in *Sorocea*. These distinctive characteristics clearly serve to separate the two genera despite the similarity of the pistillate flowers.

The reduced flowers of *Clarisia* and *Acanthinophyllum*, lacking a definite perianth, are more difficult to distinguish. The stamens of both genera are straight before anthesis, but the anthers of *Clarisia* are subbasifixed while those of *Acanthinophyllum* are usually dorsifixed. The smaller size of the anthers (ca. 0.3 mm.) and the retrorse uncinuate trichomes of the peduncle further distinguish *Acanthinophyllum*. I believe that the reduction of the staminate flowers in these two genera does not reflect a true relationship but rather a parallel evolution. Without intermediate stages or morphogenetic studies it is not possible to indicate how this reduction took place. Woodson (1960, p. 125) has described an interesting series among several species in *Brosimum* where there is a gradual reduction in stamen number and a striking change in the mode of dehiscence. However there may be another way in which the staminate flowers became reduced. This would require that the flowers first became broadly sessile with the stamens and perianth parts arising separately from the rachis as in some species of *Sorocea*. Following this, reduction in the perianth parts together with a loss of symmetry might give rise to spikes such as are found in *Clarisia* and *Acanthinophyllum*.

PISTILLATE FLOWERS

The pistillate flowers of the four genera under discussion are very similar. This is not unexpected since the basic plan of the gynoecium is quite uniform in the Urticales. The fusion of perianth parts of the pistillate flower is frequent in Moraceae and is not in itself indicative of close relationship. I have placed some emphasis on the length and form of the style branches which would separate *Trophis* and *Clarisia* from *Sorocea* and *Acanthinophyllum*. The short style branches and free perianth tube of *Acanthinophyllum* ally it to *Sorocea* rather than to *Clarisia*, with which it had been made congeneric by Lanjouw. The fruit of the genera are quite similar, but the embryo of *Sorocea* may be separated on the basis of its fused cotyledons and prominent hypocotyl 2-3 mm. long. The cotyledons of the other genera are free and the hypocotyl is minute.

ANATOMICAL CHARACTERS

The trichomes, while often not consistent among all the species of a genus, may nevertheless be useful in suggesting relationships with other genera. *Sorocea*, for example, usually possesses minute (0.05 mm.) multicellular gland-tipped trichomes. Though species of *Sorocea* in Central America may lack these trichomes, I believe it is significant that they are not found in any of the other genera studied. *Acanthinophyllum* can be immediately distinguished from the other genera under consideration by its small (0.1 mm.) retrorse uncinuate trichomes. The leaf surfaces of *Trophis* can be distinguished from other genera by the minute (0.02 mm.) broadly aculeiform trichomes bordered by about a dozen small epidermal cells. These trichomes are numerous in the usually scabrous leaves of *T. racemosa* but

sparse in the other species. *Clarisia* lacks distinguishing trichomes that might serve to aid in its placement.

The epidermal cells of *Acanthinophyllum* have a deeply sinuate outline unlike those of the other genera. These and the smaller trichomes can be seen on dried herbarium specimens under low power of the compound microscope by reflected light; clearing is unnecessary.

RELATIONSHIPS OF THE GENERA

The subfamilies Moroideae and Artocarpoideae have been defined on the basis of whether the stamens are inflexed or straight in bud. As a result, *Trophis* has been placed in the Moroideae and *Clarisia*, *Acanthinophyllum*, and *Sorocea* in the Artocarpoideae. These subfamilies also have been divided on the basis of leaf vernation. The Moroideae have conduplicate leaf vernation while the Artocarpoideae have involute leaves. *Clarisia* has conduplicate leaf vernation but straight stamen aestivation, a contradiction of the subfamilial criteria. If the staminate flowers have become disorganized there is no reason to assume the orientation of the stamens could not change radically. I believe that the criterion of staminal position prior to anthesis cannot be critically applied to such reduced forms as *Clarisia* and that other characters must be sought in determining relationships.

Inflorescence type has been used in classification at the tribal level. In *Sorocea* and *Clarisia*, however, the inflorescences are quite variable and anatomical criteria may prove more important in determining generic relationships. In the absence of a modern study of the family it is not possible to define the relationships of the four genera under discussion. The short remarks that follow indicate what I believe to be their affinities.

Trophis, with the stamens inflexed in bud, is clearly a member of the Moroideae related to *Paratrophis* of the western Pacific. The valvate aestivation of the staminate flowers and consistently tubular perianth in the pistillate flowers separate *Trophis* from *Paratrophis* despite the fact that *P. philippinensis* has a tubular pistillate perianth very similar to that of *Trophis*.

Clarisia, with long slender style branches and subbasifixed anthers, resembles *Trophis* more closely than the other genera I have studied. This would imply that the stamens were originally inflexed in bud and agrees with the fact that the leaves are conduplicate in bud; a characteristic of the subfamily Moroideae. I would therefore transfer *Clarisia* from the subfamily Artocarpoideae to the Moroideae and place it near *Trophis* among New World genera.

Acanthinophyllum was considered congeneric with *Clarisia* by Lanjouw but I believe that actually they are not closely related. The short-styled pistillate flowers with free perianth tube resemble those of *Sorocea*. The retrorse unciniate trichomes and sinuate epidermal cells are also found in *Trymatococcus* of the Moroideae and *Helianthostylis* of the Artocarpoideae among American genera. On the basis of the characters of the pistillate flowers I would retain *Acanthinophyllum* in the Artocarpoideae and place it near *Helianthostylis*.

Sorocea is clearly referable to the Artocarpoideae where it was placed in the fundamental study of Trécul (1847) and with which later investigators have con-

curred. Inasmuch as the New World Artocarpoideae are in need of a thorough general study there is no point to suggesting a change in the placement of *Sorocea* by Engler in "Das natürlichen Pflanzenfamilien" which was based on the work of Bentham and Hooker (1880).

ILLUSTRATIONS

The illustrations are my own. The foliage is nearly half natural size while the staminate and pistillate flowers are about 8x. The inflorescences with young fruit are reproduced at a magnification of about 4x.

MATERIALS

This study is based on specimens from the following herbaria. The abbreviations are taken from Lanjouw & Stafleu's 'Index Herbariorum,' Part 1 (Regnum Vegetabile vol. 15, 4th edition, 1959).

- A—Arnold Arboretum, Harvard University, Cambridge
- B—Botanisches Museum, Berlin-Dahlem
- BM—British Museum, London
- C—Botanical Museum and Herbarium, Copenhagen
- F—Chicago Natural History Museum, Chicago
- GH—Gray Herbarium of Harvard University, Cambridge
- LIL—Instituto Miguel Lillo, Tucumán
- MEXU—Herbario Nacional del Instituto de Biología, Mexico
- MG—Museu Paraense Emilio Goeldi, Belem
- MICH—University Herbarium, University of Michigan, Ann Arbor
- MO—Missouri Botanical Garden, Saint Louis
- NY—New York Botanical Garden, New York
- P—Muséum National d'Histoire Naturelle, Paris
- PB—Jardim Botânico, Rio de Janeiro
- S—Botanical Department, Naturhistoriska Riksmuseum, Stockholm
- US—U. S. National Museum, Smithsonian Institution, Washington
- Y—Yale School of Forestry, New Haven

I am indebted to the curators of these herbaria for the loan of specimens which included many valuable types. I also wish to thank Dr. George Van Schaack for assistance in the use of the library of the Missouri Botanical Garden. I am especially indebted to Professor Robert E. Woodson, Jr., for suggesting this study and for his advice and guidance throughout the course of its completion.

KEY TO THE GENERA

- A. Cotyledons distinct in the seed; staminate flowers tetramerous with valvate aestivation or not definitely organized; lacking multicellular gland-tipped trichomes on the leaves B
- B. Anthers 0.5 mm. long or longer; pistillate flowers with long slender style branches; peduncles lacking minute retrorse uncinatate trichomes; leaves conduplicate in bud, midvein impressed above C
- C. Staminate flowers tetramerous, the tepals valvate and the stamens inflexed in aestivation; pistillate flowers sessile or if pedicellate lacking bracts at the base of the receptacle..... I TROPHIS
- CC. Staminate flowers not definitely organized; pistillate flowers pedicellate with peltate bracts at the base of the receptacle II CLARISIA

- BB. Anthers 0.2—0.3 mm. long the staminate flowers not definitely organized; pistillate flowers with short broad style branches; peduncles densely invested with minute (0.1 mm.) retrorse uncinata trichomes; leaves involute in bud, the midvein prominulousIII ACANTHINOPHYLLUM
- AA. Cotyledons fused in the seed; style branches usually short and broad; staminate flowers tetramerous, the tepals decussate-imbricate and the stamens straight in aestivation; leaves involute in bud, multicellular gland-tipped trichomes usually present on the leaves, midvein impressed aboveIV SOROCEA

TAXONOMY

I. TROPHIS P. Br.

TROPHIS P. Br. Hist. Jamaica 357. 1756, nom. conserv. [T.: *T. Americana* L. = *T. racemosa* (L.) Urb.]

Bucephalon L. Sp. Pl. 1190. 1753, nom. rejic. [T.: *B. racemosum* L.]

Skutchia Pax & Hoffm. ex Morton, in Journ. Wash. Acad. Sci. 27: 306. 1937. [T.: *S. caudata* Pax & Hoffm.]

Dioecious laticiferous unarmed shrubs and trees. Leaves alternate, distichous, bistipulate, pinnately veined, the petioles sulcate above. Stipules lateral, caducous or occasionally persistent, their scars encircling less than half the stem. Inflorescences axillary on the leafy stems, paired or solitary, racemose or spicate, with triangular or suborbicular bracts along the rachis. Flowers unisexual, regular and basically tetramerous, usually lacking along one side of the inflorescence. Staminate flowers: sessile or pedicellate; perianth 4-parted or 4-lobed, the tepals equal and valvate; stamens 4, antetepalous, strongly inflexed in the bud but erect at anthesis, filaments slender and glabrous, the anthers subcentral with 2 somewhat divergent thecae, dehiscing longitudinally, introrse; pistillode always present, cylindrical to rectangular, puberulent. Pistillate flowers: sessile or pedicellate, the perianth tubular, irregularly or minutely 4-lobed at the apex; pistil 1, the ovary superior to inferior by adnation of the perianth tube, 2-carpellate, unilocular, the ovule solitary, anatropous and pendulous from below the apex of the locule, the style deeply bifid, the style branches long and slender with the inner stigmatic surface densely and minutely papillate. Fruit drupaceous, the perianth tube accrescent and succulent, the stone globose, the embryo large and straight with thick equal cotyledons and minute hypocotyl, without endosperm.

The genus was first recorded by Plumier in 1703 (Nova Plant. Amer. Gen. p. 52) as *Bucephalon* and this was adopted by Linnaeus in his Genera Plantarum (1737) and Species Plantarum (1753). However, preferring a more adequate description, Linnaeus later (Systema Naturae ed. 10, p. 1289. 1759) chose to use the name *Trophis* described by Patrick Browne in 1756 (p. 357). Usage has concurred with Linnaeus and has led to the conservation of *Trophis*. The name is derived from the Greek word τροφή (nourishment) referring to its frequent use as forage.

Trophis has not received monographic study since Bureau's treatment of the Moraceae in De Candolle's 'Prodromus' (1873) and although the species are rather closely knit, their identification is usually not difficult. Determining a phylogenetic sequence for the four species, however, is a somewhat conjectural matter. I have begun the sequence with *T. racemosa*, in some respects the most specialized species. *T. racemosa* rejoys a much wider distribution, has adapted to a greater range of habitats, and possesses greater morphological variation than is found in any other

species. These considerations lead me to suspect that it is the oldest element of the genus. The lack of fusion of the staminate perianth parts corroborates this view, but the usually inferior ovary and condensed inflorescences are definitely advanced. I believe that *Trophis* is closely related to *Paratrophis* of the southwest Pacific in which the pistillate perianth is usually 4-parted and imbricate. In *Paratrophis* the pistillate flowers are broadly sessile, quite similar to *T. racemosa* and the major argument for the antiquity of the latter. If this view is correct, the long pedicels of pistillate flowers and fruit in the other species of *Trophis* are secondarily evolved. The fact that the fruit of *T. racemosa* is never pedicellate while the fruit of the other species are occasionally sessile may indicate that the latter, less stable, condition is derived.

The geographical center of the genus is in southern Mexico where all four species are found.

KEY TO THE SPECIES

- a. Pistillate flowers quite sessile and not constricted at the rachis; fruit sessile, densely velutinous; staminate flowers sessile and crowded, the perianth parts essentially free; leaves frequently scabrous on either or both surfaces. Mexico to Peru, Venezuela and the West Indies1. *T. RACEMOSA*
- aa. Pistillate flowers pedicellate or rarely subsessile but constricted at the rachis; fruit usually pedicellate, sparsely puberulent to glabrescent; staminate flowers sessile or pedicellate, usually not crowded, the perianth parts connate toward the base; leaves never scabrous.
 - b. Leaves glabrous or very sparsely puberulent beneath; branchlets slender; pistillate flowers sparsely cinerous-puberulent.
 - c₁ Staminate flowers, sessile; pistillate inflorescence to 10 cm. long; leaves elliptic to elliptic-oblong or obovate, usually over 3 cm. wide. Mexico to Guatemala2. *T. MEXICANA*
 - cc. Staminate flowers pedicellate; pistillate inflorescences to 4 cm. long; leaves linear-lanceolate to narrow elliptic, less than 3 cm. wide. Southern Mexico to Guatemala3 *T. CHIAPENSIS*
 - bb. Leaves persistently short-pilose beneath; branchlets thick; pistillate flowers densely ferruginous-puberulent. Southern Mexico4. *T. CUSPIDATA*

1. *TROPHIS RACEMOSA* (L.) Urb. Symb. Ant. 4:195. 1905.

Bucephalon racemosum L. Sp. Pl. 1190. 1753. [T.: Linn. Herb. London (1156.1) (♀ ♂) photo.]

Trophis americana L. Syst. Nat. ed. 10. 1289. 1759.

Shrubs or trees to 18 m. tall, the trunk to 50 cm. in diameter and often divided, with rough brown bark and milky latex; leafy branchlets usually stout, 2.0-3.8 mm. in diameter, hirtellous becoming glabrescent, conspicuously lenticellate on older parts. Leaf blades obovate to oblong or elliptic, 5-23 cm. long, 2.4-10 cm. broad, acuminate to subcaudate-acuminate, obtuse to acute and often slightly oblique at the base, subcoriaceous to membranaceous, often scabrous, glabrous, above and glabrous or minutely strigose beneath, the midvein plane or impressed above, prominent below with 4-8 pairs of ascending secondary veins arching upward near the entire or serrulate, occasionally deeply sinuate margin; petiole 4-16 mm. long, 0.7-2.0 mm. in diameter, minutely puberulent and glabrescent. Stipules caducous or persistent, lanceolate, 2.0-3.8 mm. long, their scars small and inconspicuous. Staminate inflorescences: spicate, paired or solitary in the axils of leaves or rarely of undeveloped or fallen leaves, 1.5-5.0(-7.5) cm. long, the peduncles 1.3-11.0 mm. long, minutely velutinous, the rachis with numerous triangular or suborbicular

peltate or basally attached bracts 0.5-1.1 mm. broad; flowers 15 to many and densely crowded, sessile or rarely subsessile, about 4 mm. long and 4 mm. wide, the perianth parts 1.6-2.2 mm. long, 1.0-1.5 mm. wide, acute or obtuse at the apex, free or basally connate, minutely puberulent, the trichomes about 0.1 mm. long; staminal filaments 2.0-2.6 mm. long, the anthers 0.8-1.2 mm. long; pistillode 0.3-0.6 mm. long. Pistillate inflorescence; spicate, paired or solitary in the axils of leaves or rarely fallen or undeveloped leaves, 1.8-4.0(-6.0) cm. long, the peduncle 1.2-10 (-14) mm. long, minutely velutinous, the rachis with numerous triangular or suborbicular peltate or basally attached bracts 0.5-1.2 mm. broad; flowers 4-15, broadly sessile, ovoid or conic, the perianth tube indistinctly or minutely 4-lobed at the apex, 2.0-4.5 mm. long, 1.4-2.5 mm. in diameter, densely velutinous, the trichomes about 0.1 mm. long, ovary inferior or rarely half-inferior, the style branches slender, 2.0-5.5 mm. long. Fruit globose or ovoid, occasionally with a narrow collar at the apex, about 1 cm. in diameter, smooth or ridged, minutely velutinous, becoming bright red and sometimes blackish.

This species is quite common throughout a range that extends from southern Sonora, Mexico, to eastern Peru and the West Indies. It is found on hillsides and river valleys in Mexico and moist forests in Central and South America. Within this wide area it has begun to differentiate into three morphologically distinct populations which I am recognizing as subspecies. Subspecies *ramon* and *racemosa* with their relatively thick leaves have apparently become adapted to more xeric habitats than *ssp. meridionalis*. The elongate inflorescences and occasionally half-inferior ovaries of *ssp. meridionalis* add to my impression of its more primitive nature. Subspecies *ramon* and *meridionalis* intergrade quite imperceptibly in western Panama and northern Colombia. I have used the Panama-Colombia boundary to separate the two subspecies realizing, of course, that no real discontinuity exists. The membranaceous, serrulate and long-acuminate leaves of most Colombian specimens make their assignment to *ssp. meridionalis* quite natural even though some may have the congested pistillate inflorescences characteristic of *ssp. ramon*.

T. racemosa is closely related to *T. mexicana* with which it is occasionally confused. The densely velutinous fruit and scabrous leaves are diagnostic.

KEY TO THE SUBSPECIES

- a. Pistillate inflorescence to 4.5 cm. long at anthesis, the flowers distant, usually more than 1 mm. apart; leaves smooth on both surfaces, tapering to the acuminate apex
 - b. Leaves entire, firmly chartaceous to subcoriaceous, acuminate; rachis of the pistillate inflorescence 1.0-1.8 mm. in diameter. West Indies....1c. *ssp. RACEMOSA*
 - bb. Leaves serrulate, membranaceous to chartaceous, narrowly acuminate; rachis of the pistillate inflorescence 0.6-1.2 mm. in diameter. Colombia to Peru and Venezuela1a. *ssp. MERIDIONALIS*
 - aa. Pistillate inflorescences to 2.5 cm. long at anthesis, the flowers crowded, rarely more than 1 mm. apart; leaves scabrous or scabrescent on either or both surfaces, firmly chartaceous to subcoriaceous, usually abruptly short-acuminate. Mexico to Panama1b. *ssp. RAMON*
- 1a. *TROPHIS RACEMOSA ssp. meridionalis* (Bur.) W. Burger, comb. & stat. nov.

Trophis americana γ *meridionalis* Bur. in DC Prodr. 17: 253. 1873. [T.: *Bonpland* 1512 (P) (δ)]

Sorocea colombiana Standl. in Trop. Woods, no. 19: 39. 1929. [T.: *Curran* 186 (F) (η)]

Trophis racemosa var. *meridionalis* (Bur.) Macbr. in Field Mus. Pub. Bot. 13²: 308. 1937.



Figure 1. *Trophis racemosa*, ssp. *meridionalis*: from Killip 35580 (1 [upper right] & 2). ssp. *ramon*: from Burger 148 (3). ssp. *racemosa*: from Harris 10858 (4).

Leaf blades elliptic to elliptic-oblong, (5.0-) 7.5-19.0 cm. long 2.5-6.5 cm. broad, gradually tapering to a long and narrowly acuminate apex, acute to obtuse at the base, membranaceous to chartaceous, smooth on both surfaces, glabrous, the margin serrulate. Staminate inflorescences: 2.5-6.0 cm. long, the flowers numerous and densely crowded or rarely somewhat distant. Pistillate inflorescences: 1.5-4.5 cm. long, the rachis 0.6-1.2 mm. in diameter, the pistillate flowers usually more than 1 mm. distant along the rachis.

Flowering from late October through February and May to June. Moist forests and river valleys from sea level to altitudes of 1000 meters.

Vernacular names: *Uspai-manchinga* (Peru-Ll. Williams); *Marfil* (Venezuela-Pittier).

COLOMBIA: BOLÍVAR: San Martín de Loba and vicinity, *Curran* 102 [(♂) US], 186 [(♀) F, US], 205 [(♀) S, US], 372 [(♀) US]. CAQUETÁ: Solano, 7 km. SE of Tres Esquinas, *Little & Little* 9670 [(♂) US]. CAUCA: Noanamite, Río Micay, *Cuatrecasas* 14227 [(♀) A]. CHOCÓ: Bahía de solano; *Fernandez* 310 [(♂) US] bank of of Río San Juan, near Andagoya, *Killip* 35392 [(♀) F, US]. VALLE DEL CAUCA: La Trojita, Río Calima, *Cuatrecasas* 16348 [(♂) F], 16810 [(♀) F], Cisneros, *Killip* 35580 [(♂) BM, F, S, US]; GOAJIRA: 12 km. S. of Carraipia, *Haught* 4224 [(♂) F, US]. PUTUMAYO: La Concepción, *Cuatrecasas* 10840 [(♂) F, US]. SANTA MARTA: *H. H. Smith* 1752 [F (♀), MO (♂), P (♂), S (♂), US (♂)], 2732 [(♂) BM, F, MO, S, US]. SUR DE SANTANDER: vicinity of Puerto Berrio, *Haught* 1864 [(♂) F, US]. WITHOUT PRECISE LOCALITY: ad Fluvium Magdalenam, *Bonpland* 1512 [F (?), P (♂)]; *mutis* 2992 [(♀) F].

VENEZUELA: ARAGUA: Patanemo Valley, *Pittier* 8659 [(♂) NY, US]; Parque Nacional, *Ll. Williams* 10719 [(♀) F].

ECUADOR: NAPO-PASTAZA: Tena. *Asplund* 9387 [(♀) NY, P]; Tiputini-Lagarto Cocha, *Fagerlind & Wibom* 2376 [(♀) S], 2403 [(♀) S]; Chimbo River valley, *Rimbach* 187 [(♀) F, NY, S].

PERU: AMAZONAS: Aramango, *Woytkowski* 5645 [(♀) MO]. HUANUCO: Tingo María, *Stork & Horton* 9506 [(♂) F]. LORETO: Yurimaguas, lower Río Huallaga, *Killip & Smith* 27685 [(♀) F]; Florida, Río Putumayo, *Klug* 20709 [(♂) BM, F, MO, S]; above Pongo de Manseriche, *Mexía* 6282 [(♂) BM, F, LIL, MICH, MO, S], 6303 [(♀) BM, F, LIL, MICH, MO, S]; Santiago-Mundung am Pongo de Manseriche, *Tessmann* 4083 [(♀) S]; lower Río Huallaga, *Ll. Williams* 4658 [(♀) F], SAN MARTÍN: Juanjui, Alto Río Huallaga, *Klug* 3794 [(♂) BM, F, MO, S]; near Tarapoto, *Spruce* 4521 [(♀) B, BM], *Ule* 6838 [(♀) MG], *Ll. Williams* 6542 [(♀) F], 6573 [(♀) F].

1b. *TROPHIS RACEMOSA* ssp. **ramon** (Schlecht. & Cham.) W. Burger, comb. & stat. nov.

Trophis Ramon Schlecht. & Cham. *Linnaea* 6: 357. 1831. [T.: *Scheide & Deppe* s.n. near Misantla (B no. 6750) (♀)].

Trophis americana β. *Ramon* Bur. in *DC Prodr.* 17: 253. 1873.

Sahagunia urophylla Donn. Sm. in *Bot. Gaz.* 40: 11, 1905. [T.: *Wilson* 54 (US) (♀)].
Clarisia urophylla (Donn. Sm.) Lanj. in *Rec. Trav. Bot. Néerl.* 33: 263. 1936.

Leaf blades obovate to elliptic-oblong, ovate or elliptic, 5.0-23 cm. long, 2.5-10 cm. wide, short-acuminate to subcaudate-acuminate or rarely tapering to a long-acuminate apex, obtuse or occasionally acute at the base, subcoriaceous to thickly chartaceous, scabrous or scabrescent, glabrous above and glabrous or minutely strigose beneath, the margin entire or occasionally serrulate, the new shoots often with deeply sinuate leaves. Staminate inflorescence: 1.2-4.0(-5.8) cm. long, the staminate flowers densely crowded. Pistillate inflorescences: 0.6-1.8(2.7) cm. long at anthesis, the flowers densely clustered or closely approximate, the rachis 0.8-2.0 mm. in diameter.

The scabrescent, pergamentaceous leaves and congested inflorescences are appar-

ently associated with an adaptation to more xeric conditions than those tolerated by other members of the genus. This is the only subspecies of *T. racemosa* sympatric with other species of the genus.

Dry hillsides, ravines, river valleys and forests; flowering intermittently throughout the year, from sea level to 2500 m. altitude.

Vernacular names: *Ramón* (Mexico to Panama); *Capomillo* (Mexico-Ortega); *Ushi* (Mexico-Mexía); *Cha cox* (Mexico-Flores); White ramon, *Ramón colorado*, *Yaxox* (British Honduras-Lundell); *Ojushte* (El Salvador-Standley); *Ujushte* (El Salvador-Calderón); *Hoja tinta* (Honduras-von Hagen); Breadnut, *Ojoche macho* (Panama-Cooper & Slater).

MEXICO: CHIAPAS: Escuintla: *Matuda* 2598 [(♀) F, MICH], 4022 [(♀) MICH, MO], Esperanza, *Matuda* 16794 [(♀) F], La Grada, *Matuda* 16799 [(♂) F]; S. Terena Acapatahua, *Matuda* 16751 [(♂) F, MICH]. COLIMA: Coahuayana, *Emrick* 133 [(♂) F]. GUERRERO: San Antonio, Montes de Oca, *Hinton* 11540 [(♂) F, US]; Temisco, barranca de la Guacamaya, Adama, *Mexía* 8844 [(♂) F, MO, S, US]. JALISCO: S. of Puerto Vallarta, on canyon slope, *Mexía* 1142 [(♂) F, BM, MICH, MO]. MÉXICO: Temascaltepec: Acatitlán, *Hinton* 3165 [(♂) US], 3186 [(♀) US], Ixtapan, *Hinton* 3643 [(♀) F, MO, US], Pungarancha, *Hinton* 6750 [(♀) F, MO, US]. MICHOACÁN: Coalcomán: San Pedro, *Hinton* 15901 [(♀) BM, LIL, MICH, US], Aquila, *Hinton* 16291 [(♀) US]. NAYARIT: vicinity of Acaponeta, Tepic, *Rose, Standley & Russell* 14428 [(♀) US]. OAXACA: Trapiche de la Concepción, *Liebmann* 14267 [(♀) C, F, P]; S. Jago Amatlán, *Liebmann* 14269 [(♀) C, F]; Between S. Miguel del Puerto & Guatulce, *Liebmann* 14271 [(♀) C]; Chinantla, *Liebmann* 14270 [(♂) C]. SAN LUIS POTOSÍ: edge of El Salto River, El Naranjo, *Burger* 148 [(♀) MO], 150 [(♀) MO]; Tamazunchale, *Edwards* 667 [(♀) F]; 7 mi. W. of N. Morelos, Tam., *Kenoyer & Crum* 3770 [(♂) MICH]. SINALOA: Cerro Colorado vicinity of Culiacán, *Brandege S. N.* [(♀ ♂) US]; Mesa Malquesón, Cerro Colorado, *Gentry* 5147 [(♀) MICH, MO]; Capadero, Sierra Tacuichamona, *Gentry* 5582 [(♀) MO]; Quebrada del Macaral Balboa, San. Ignacio, *Montes & Salazar* 855 [(♀) US]; Rosario, Cacalotán, *Ortega* 7100 [(♂) F, US]; Marastan, *Ortega* 7493 [(♂) US]. SONORA: Quiricoba, Dist. Alamos, *Gentry* 736M [(♀) MICH]. TAMAULIPAS: Tampico de Tamaulipas, *Berlandier* 172 [(♀) P]; Rancho Las Yucas, Sa. de Tamaulipas, *Dressler* 2372 [(♀) MO]; Julillo to Río Sabinas, N. of Mante, *Duke* 3636 [(♀) MO]; near Rancho de Barberena, *LeSueur* 570 [(♀) F, US]; vicinity of Tampico, *Palmer* 337 [(♀) F]. VERA CRUZ: *Bonpland* 4483 [(♀) P]; Fortín, *Kerber* 395 [(♀) BM, C, US]; Mirador, *Liebmann s.n.* [(?) C]; Mirador and Zacuapan, *Liebmann* 14268 [C (♀), C (?), F (?)]; Zacuapan, *Liebmann* 15111 [(♂) C]; Cordoba, *Matuda* 0685 [(♂) MICH, MO, US]; Hda. Mirador, *Nelson* 66 [(♀) US]; Is. of Juana Ramírez, 56 km. S. of Tampico, *Palmer* 454 [(?) US]; Zacuapan and vicinity, *Purpus* 2316 [(♀) F, MO, US], 4386 [(♀) BM, MO, US], 5049 [(♀) MO, US], 5988 [(♂) BM, F, MO, US], 10837 [(♂) MICH, US], 12072 [(♂) F, MO, US], 14372 [(♂) F]; near Rancho Remudadero, *Purpus* 11070 [(♂) F], 11044 [(♂) US], 16381 [(♀) F]; Misantla, *Schiede & Deppe s.n.* [(♀) B, BM, MO]. YUCATÁN: Progreso, *Flores, s.n.* [(♀) F]. WITHOUT PRECISE LOCALITY: Córdoba, *Bourgeau* 7069 [(♀) P]; *Haenke* 1468 [(♂) F]; *Sesse, Mociño, Castillo & Maldonado* 4647 [(♂) F].

BRITISH HONDURAS: BELIZE: Bright Lookout Bank, Sibun River, *Gentle* 1447 [(♀) F, MICH, MO, US, S]. EL CAYO: Mountain Pine Ridge, *Bartlett* 11867 [(?) MICH]; Monkey Falls, *Lundell* 6970 [(♂) C, F, MICH, S]. ORANGE WALK: Honey Camp, *Lundell* LP19 [(♂) F, US], *Meyer* 157 [(?) F]. STANN CREEK: 19 miles, Stann railway, *Gentle* 2704 [(♀) F, MICH]; Silk Grass Creek Reserve, *Gentle* 3097 [(♀) MICH, MO, US]. TOLEDO: Punta Gorda, *Schipp* 1010 [(♂) BM, F, MICH, MO, S]; Big Rock, Toledo, *Schipp* 1074 [(♀) BM, F, MICH, MO, S]; Tomash River, *Stevenson* 153 [(♀) F]; *Stevenson & Smart* 140 [(♂) F, MICH].

GUATEMALA: ALTA VERAPAZ: Saquijá, 43 km. NE. of Cobán, *Standley* 70185 [(♂) F]; region of Chelac, NE. of Carchá, *Standley* 70403 [(?) F]; Near Pancajché, *Standley* 70793 [(?) F]; mountains between Tactic and Cobán, *von Tuerckheim* 112167 [(♂) C, US], 112169 [(♀) C, US]; Cubilquitz, *von Tuerckheim* 8581 [(♂) F, US]; along river, Chamá, *Johnson* 514 [(♂) MO, US]. CHIQUIMULA: Volcán Quezaltepeque *Steyermark* 31511 [(♂)

F]. EL PROGRESO: near Finca Piamonto, *Steyermark* 43664 [(?) F]. ESCUINTLA: along Río Michatoya, *Standley* 89114 [(?) F]. HUEHUETENANGO: between Finca San Rafael and Finca Providencia, *Steyermark* 49549 [(♀) F]; along Río Trapichillo, below La Libertad, *Steyermark* 51030 [(♂) F]; Paso del Boquerón, along Río Trapichillo, *Steyermark* 51185 [(?) F]. IZABAL: near Quiriguá, *Standley* 72483 [(♂) F]. PETÉN: Uaxactún, *Bartlett* 12354 [(?) F, MICH, US]; Santa Cruz, *Bartlett* 12375 [(♀) F, MICH]; Santa Teresa, Subin River, *Lundell* 2917 [(♀) BM, F, MICH, S]. RETALHULEU: vicinity of Retalhuleu, *Standley* 88452 [(?) F], 88549 [(?) F], 88729 [(♂) F]. SANTA ROSA: vicinity of Chiquimulilla, *Standley* 79291 [(♀) F]; along Avellana Road, S. of Guazacapán, *Standley* 79513 [(♀) F]; 79524 [(?) F]. SUCHITEPÉQUEZ: vicinity of Tiquisate, *Steyermark*, 47670 [(?) F], 47774 [(?) F, US]. ZACAPA: Loma El Picacho, *Steyermark* 42744 [(♀) F].

EL SALVADOR: CHALATENANGO: *Calderón* 2178 [(?) US]. SAN SALVADOR: San Salvador, *Calderón* 845 [(♂) US], 1065 [(♂) MO, US], 1448 [(♀) MO, US], *Standley* 22458 [(?) US]. SAN VICENTE: vicinity of San Vicente, *Standley* 21404 [(♀) F, MO, US]. SAN SONSONATE: Izalco, *Calderón* 1698 [(?) US]; vicinity of Sonsonate, *Standley* 22340 [(?) S, US]. WITHOUT PRECISE LOCALITY: *Renson* 112 [(♀) US].

HONDURAS: ATLÁNTIDA: Triunfo, near Tela, *Standley* 53841 [(♀) F, US]; Lancetilla Valley, *Standley* 54312 [(?) F, US]; vicinity of Tela, *Standley* 54727 [(?) F, US]. SANTA BÁRBARA: área de pinoroble de Río Ulúa, *Molina* 3810 [(♀) BM, F, MO, US]. TEGUCIGALPA: Mont. de la Flor, *Hagen & Hagen* 1130 [(?) F], 1177 [(?) F]. YORO: Concepción, *Edwards* P-644 [(♂) F, US]; near Progres, *Standley* 54997 [(?) F, US]. WITHOUT PRECISE LOCALITY: Highland Creek, Puerto Sierra, *Wilson* 54 [(♀) US], 250 [(♀) US].

NICARAGUA: GRANADA: near Lakes, *Baker* 21 [(♂) MICH, MO], 784 [(♂) US]. MANAGUA: between El Crucero and Finca Santa Julia, *Standley* 8357 [(?) F]. ZELAYA: vicinity of El Recreo, *Long* 215 [(♂) F], *Standley* 19797 [(♀) F]; Río Grande, *Molina* 2497 [(♀) F, US].

COSTA RICA: PUNTARENAS: Jicaral, *Orozco* 406 [(♀) F].

PANAMÁ: BOCAS DEL TORO: Changuinola Valley, region of Almirante, *Cooper* 349 [(♀) C, F, US, YU], *Cooper & Slater s.n.* [(♀) F, US, YU], 4 [(♀) US, YU], 4a [(♀) US, YU], 326 [(♂) F, YU], *Dunlap* 16 [(♀) F], 40 [(♀) F]; *Seibert* 1581 [(♂) MO, US], 1583 [(?) MO, US]; Chiriquí Lagoon, Water Valley, *von Wedel* 1599 [(♀) MO, US]; Old Bank Island, Chiriquí Lagoon, *von Wedel* 2075 [(♀) MO, SU]; Río Cricamola, between Finca St. Louis and Konkintoë, *Woodson, Allen & Seibert* 1924 [(♀) F, MO]; WITHOUT PRECISE LOCALITY; *von Wedel* 196 [(♀) MO]. CANAL ZONE: Barro Colorado Island, *Bailey & Bailey* 669 [(♀) F], *Shattuck* 827 [(?) F], 1164 [(♀) F], *Standley* 41080 [(?) US]; around Culebra, *Pittier* 2255 [(♀) US], 3627 [(♀) US]; around Gamboa, *Pittier* 6637 [(♂) US], 6652 [(♀) US]; near Gatún, *Standley* 27287 [(?) US]; vicinity of Fort Sherman, *Standley* 30970 [(?) US]. CHIRIQUÍ: Peninsula de Burica, vicinity of San Bartolomé, *Woodson & Schery* 866 [(♀) MO, US]. COLÓN: between France Field C. Z. and Catival, *Standley* 30235 [(?) US], 30296 [(?) US]. DARIÉN: between Payo and Palo de las Letras, *Stern et al.* 210 [(?) MO]. PANAMÁ: Taboga, *Hayes* 658 [(♂) BM]; Hydrographic Sta., Trinidad River, *Pittier* 6636 [(♂) C, P, US]. WITHOUT PRECISE LOCALITY: Western Panama, *Stork* 16 [(♀) US].

1c. *TROPHIS RACEMOSA* ssp. *RACEMOSA*

Leaf blades elliptic to oblong or ovate, (6.0-) 8.0-18.5 cm. long, 3.0-8.5 cm. wide, acuminate, the acumen usually short and gradually tapering from a broad base, obtuse or occasionally acute at the base, chartaceous to pergamentaceous, smooth on both surfaces, glabrous, the margin entire or occasionally with several deep sinuses. Staminate inflorescences: 3.7-7.5 cm. long, the staminate flowers numerous and densely crowded. Pistillate inflorescences: 0.9-3.8 cm. long, the rachis 1.0-1.8 mm. in diameter, the flowers usually distant along the rachis.

The absence of this subspecies in the Lesser Antilles and its resemblance to ssp. *ramon* suggest that the West Indian plants originally migrated from Central America. Ssp. *racemosa* is quite uniform in its pattern of variation and I have been unable to detect any insular differentiation.

Hillsides and forests from sea level to 1000 meters altitude; flowering from September through March.

Vernacular names: *Ramón* (Cuba, Haiti, and Jamaica); *Ramoon* (Jamaica-Harris); *Ramón de bestia* (Cuba-Ekman).

CUBA: CAMAGUEY: La Gloria to Columbia, *Shafer* 617 [(♀) F]. HABANA: near Villa Real, *Ekman* 532 [(?) S]. LAS VILLAS: Soledad, Cienfuegos, *Jack* 5002 [(♀) P, S], 5842 [(♂) S]. ORIENTE: Bayate, *Ekman* 2981 [(♂) S]. 4540 [(?) S], 4594 [(♀) S], 7665 [(♂) S], 9005 [(♂) F, S, (?) S]; Baracoa, *Ekman* 4200 [(?) S]; Sierra de Nipe, at Río Piloto, *Ekman* 6687 [(♀) S]; La Ermita, *Hioram* 4931 [(♂) C]; vicinity of Piedra Gorda, *Shafer* 3272 [(♀) F]. Without precise locality, *Wright* 589 [BM (♂), S (♀ ♂), 589 & 592 [MO (♀), S (♀ ♂)] 592 [(♀) F, MO, S], *s.n.* [(♀) MO]. PINAR DEL RÍO: Morillo, woods bordering the Manglares, *Ekman* 17430 [(?) S]; Las Martinas to the coast, *Shafer* 11078 [(♀) F, MO]. WITHOUT PRECISE LOCALITY: *Sagra* 490 [(♀) P].

HAITI: OUEST: Massif du Nord, Marmelade, *Ekman* 8285 [(♀) S]; Massif de la Selle, Papette, *Ekman* 9387 [(♂) S].

JAMAICA: CORNWALL: Trelawny: vicinity of Troy, *Perkins* 1005 [(♀) B]; vicinity of Burnt Hill, Cockpit Country, *Proctor* 20588 [(♀) BM]. Westmoreland: Kentucky Hill, *Harris* 10211 [(♂) BM, F]. MIDDLESEX: Clarendon: Tom's Cave Wood, *Harris* 10858 [(♀) F]. SURREY: Portland, John Crow Mts., SW. of Ecclesdown, *Howard, Proctor & Stearn* 14782 [(♀) BM]. WITHOUT PRECISE LOCALITY: Cedarhurst, *Harris* 6075 [(♀) BM, C]; Hall's Delight, *Harris* 5550 [(♀) BM, F].

PUERTO RICO: ARECIBO: Utuado, *Buysman s.n.* (1877) [(♀) MICH], *Sintenis* 6309 [(♀) BM, C, F, MO, S]. SAN JUAN: Candelaria, near Bayamón, *Britton, Hess & Marble* 2853 [(♀) F, MO]; prope Naranjito, *Stahl* 862 [(♀) S].

REPUBLICA DOMINICANA: BARAHONA: *Fuertes* 1086 [(♂) BM, F, S]. SAN PEDRO DE MACORIS: *Rose, Fitch & Russell* 3719 [(♀) F]; Consuelo, *Taylor* 146 [(♀) F], 229 [(♂) F]. WITHOUT PRECISE LOCALITY: *Poiteau, s.n.* (ca. 1882) [(♀) P]; prope Puerto Plata, *Eggers* 1769 [(♂) S].

WEST INDIES: WITHOUT PRECISE LOCALITY: *Swartz s.n.* [(♂) S].

2. *TROPHIS MEXICANA* (Liebm.) Bur. in DC. Prodr. 17:253. 1873.

Sorocea mexicana Liebm. in Kon. Danske Vidensk. Selsk. Skr. 5. 2: 335. 1851. [T.: *Liebm. mann* 14260 (♀) (C)].

Bucephalon mexicanum (Liebm.) O. Ktze. Rev. Gen. 2: 624. 1891.

Trophis chorizantha Standl. in Field Mus. Pub. Bot. 4: 302. 1929. [T.: *Standley* 56771 (F) (♀)].

Skutchia caudata Pax & Hoffm. in Journ. Wash. Acad. Sci. 27: 307. 1937. [T.: *Skutch* 2383 (US) (♀)].

Trophis matudai Lundell, in Lloydia 2: 81. 1939. [T.: *Matuda* 2091 (MICH) (♀)].

Shrubs or trees to 20 m. tall; leafy branchlets slender, 1.5-2.6(-3.2) mm. in diameter, glabrescent or infrequently puberulent, the lenticels small and inconspicuous. Leaf blades elliptic to oblong or occasionally obovate, 8-20 cm. long, 2.5-6.5 cm. broad, acuminate, acute to obtuse at the base, firmly membranaceous to chartaceous, smooth on both surfaces, glabrous above and below or rarely sparsely puberulent below, the midvein plane above, prominent below with 4-9 pairs of ascending secondary veins arching upward near the bluntly serrulate or entire margin; petiole 3-15 mm. long, 0.7-1.5 mm. in diameter, glabrescent. Stipules caducous or occasionally persistent, lanceolate, 2.0-3.6 mm. long, minutely puberulent, their scars small and inconspicuous. Staminate inflorescences: spicate, solitary or less often paired in the axils of leaves or fallen leaves 4-11 cm. long and about 1 cm. in diameter at anthesis, the peduncle 3-12 mm. long, minutely puberulent, the rachis with scattered triangular or suborbicular, basally attached or rarely peltate bracts 0.4-0.8 mm. broad; flowers white or greenish, 13 to many and some-

what distant though appearing crowded at anthesis, sessile or rarely subsessile, about 4 mm. long and 4 mm. wide, the perianth parts 1.5-2.6 mm. long, 0.5-1.3 mm. wide, acute at the apex, connate (0.5-1.3 mm.) toward the base, minutely puberulent, the trichomes less than 0.1 mm. long; staminal filaments 2.0-3.2 mm long, the anthers 0.6-1.2 mm. long; pistillode prominent about 0.6 mm. long. Pistillate inflorescences: racemose, solitary or occasionally paired in the axils of leaves or fallen leaves, (2-)4-10 cm. long, the peduncles 4-25 mm. long, densely puberulent, the rachis with scattered triangular or suborbicular, basally attached or rarely petalate bracts 0.5-1.1 mm. broad; flowers (4-)6-22 and distant, the pedicels (0-)0.5-2.3 mm. long and elongating in fruit, the perianth tube minutely 4-lobed at the apex, ovoid, 1.8-5.0 mm. long, 1.2-2.8 mm. in diameter, sparsely puberulent, the ovary half-inferior, with style branches 2.8-4.5 mm. long and minutely puberulent. Fruit globose, about 5-7 mm. in diameter, strongly ridged or ridged and tuberculate, sparsely puberulent to glabrescent, becoming red, the fruiting pedicels 2.0-6.0(-13) mm. long or the fruit occasionally subsessile.

Plants of Chiapas with subsessile fruit and broad glabrescent leaves have been segregated as *T. matudai*. These specimens resemble *T. racemosa* and are the basis for my impression that *T. mexicana* represents a first divergence from *T. racemosa*. If this is true, *T. mexicana* probably represents the ancestral stock from which closely related *T. chiapensis* and *T. cuspidata* were derived.

Central Mexico to Costa Rica, in moist forests and along water courses; flowering from October to March, from sea level to 2000 m. elevation.

Vernacular names: Sweet breadnut, *Masico dulce* (British Honduras-Gentle); *Ramón blanca* (British Honduras-Lundell); *Raspa-lengua* (El Salvador-Standley).

MEXICO: CHIAPAS: Mt. Ovando, Escuintla, *Matuda* 0433 [(♂) MICH, US], 0576 [(♀) MICH, NY, US], 2091 [(♀) A, F, MICH, NY, US], 2648 [(♀) A, MICH, NY], 3978 [(♂) F, MICH, MO, NY], 3979 [(♀) A, MICH, NY], 4014 [(♂) A, MICH, MO, NY], 16157 [(♂) F, MICH]. JALISCO: La Quadrilla to San Sebastián, *Mexia* 1701 [(♂) BM, F, MICH, US]. OAXACA: Cafetal Nueva Esperanza, Pochutla, *Conzatti, Reko & Makrinus* 3064 [(♀) US]; Cafetal Concordia, *Morton & Makrinus* 2478 [(♀) A, F, S, US]; Cafetal Calvario, Cerro Espino, *Reko* 3519 [US (♂) not (♀)]. VERA CRUZ: Hacienda de Jovo, *Liebmann* 14260 [(♀) F, photo C].

BRITISH HONDURAS: EL CAYO: Valentin, *Lundell* 6422 [(♀) F, MICH]. STANN CREEK: Stann Creek valley, *Gentle* 3211 [(♂) A, MICH, MO, NY]. TOLEDO: Temash River, *Schipp* 1334 [(♀) A, BM, F, GH, MICH, MO, NY, S]. WITHOUT DEFINITE LOCALITY: Pueblo Viejo, *Schipp* 1261 [(♀) A, BM, F, GH, MICH, MO, NY, S].

GUATEMALA: ALTA VERAPAZ: between Cobán and San Pedro Carchá, *Standley* 89897 [(?) F]; Pansamalá, *von Turckheim* 1231 [(♂) F, MO, P, US]. CHIMALTENANGO: slopes of Volcán Fuego, *Steyermark* 52069 [(?) F]. ESCUINTLA: *Aquilar* 1645 [(♂) F]; Río Guacalate, *Standley* 60197 [(♀) A, F, MICH, NY]; below Las Lajas, *Standley* 64766 [(?) F], 64815 [(?) F]; Río Burrión, *Standley* 89574 [(?) F]. IZABAL: Río Juyamá, SE. of Cheyenne, *Steyermark* 39157 [(♀) F]; Río Dulce, near Livingston, *Steyermark* 39451 [(♀) F, NY]. PETÉN: between Finca Yalpemech and Chinajá, *Steyermark* 45445 [(♀) F, NY, S]. QUEZALTENANGO: Colomba, *Skutch* 1986 [(♂) A, BM, F, US]; between Finca Pirineos and Patzulín, *Standley* 86697 [(?) F]; slopes of Volcán Santa María, *Steyermark* 33499 [(♀) F]. SAN MARCOS: slopes of Volcán Tajumulco, *Steyermark* 37426 [(♂) F], 37576 [(♂) F]. SANTA ROSA: Cerro Redondo, *Heyde & Lux* 6239 [(♂) GH, MO, US]. SUCHITEPÉQUEZ: Finca Moca, *Skutch* 2094 [(♀) A, BM, F, NY, US].

EL SALVADOR: AHUACHAPAN: Finca Colima, *Standley* 20183 [(♀) GH, NY, US].

HONDURAS: ATLÁNTIDA: near Tela, *Standley* 56771 [(♀) F, US]. COMAYAGUA: above El Achote, *Yuncker, Dawson, & Youse* 6171 [(♀) F, MICH, MO, NY, S, US]. MORAZÁN:



Figure 2. *Trophis mexicana*: from Skutch 2386 (1), Skutch 1986 (2), Schipp 1261 (3), and Steyermark 45945 (4).

on and near Mt. Uyuca: *Carlson* 2445 [(♀) MICH], *Molina* 909 [(♀) F, GH, MO, US], 1108a [(♀) F, MO, US], 1300 [(♀) F, GH, MO], 1443 [(♀) F, MO], *Pfeifer* 1423 [(♀) MO], *Standley* 12431 [(♀) F], 20680 [(♀) F], *L. O. Williams* 15799 [(♀) F, LIL, MO, US], 16850 [(♀) F, GH, MO, US], *Williams & Molina* 14815 [(♀) F, GH] 15601 [(♂) F]. TEGUCIGALPA: San Juancito, *Edwards* P-43 [(?) F]. YORO: 10 mi. south of Progreso, *Record & Kuylen* H.40 [(♂) GH, NY, US].

NICARAGUA: JINOTEGA: Finca Aventina, *Standley* 9965 [(?) F].

COSTA RICA: ALAJUELA: Zarcero, *Alfaro Ruiz, A. Smith* H1558 [(♂) F, MO, NY]. GUANACASTE: El Arenal, *Standley & Valerio* 45271 [(♂) US]. SAN JOSÉ: vicinity of El General, *Skutch* 2383 [(♀) A, MO, NY, S], 2386 [(♂) A, GH, MO, US, S].

3. *TROPHIS CHIAPENSIS* Brandeg. in Univ. Calif. Pub. Bot. 6: 178. 1915. [T.: *Purpus* 7091 (UC) (♀)]

Trophis nubium Standl. in Field Mus. Pub. Bot. 22: 17. 1940. [T.: *Skutch* 925 (F) (♀)]

Shrubs or trees to 15 m. tall; leafy branchlets slender 0.8-1.8 (-2.6) mm. in diameter, minutely puberulent and glabrescent, the lenticels small and inconspicuous. Leaf blades narrowly oblong-lanceolate to linear-lanceolate or narrowly elliptic, 5-16 cm. long, 1.2-3.0(-3.8) cm. broad, gradually tapering to the long-acuminate apex, the acumen 1.0-2.5 mm. wide and 5-23 mm. long, acute at the base and often slightly oblique, membranaceous to chartaceous, smooth on both surfaces, glabrous above and below, midvein plane or slightly impressed above, prominent below, with 5-11 pairs of ascending secondary veins arching upward near the serrulate margin; petiole 3.8-12 mm. long, 0.5-1.3 mm. in diameter, sparsely and minutely puberulent, glabrescent. Stipules persistent or caducous, narrowly deltoid to lanceolate, 1.2-3.3 mm. long, minutely puberulent or glabrescent, their scars small and inconspicuous. Staminate inflorescences: racemose, solitary in the axils of leaves or fallen leaves, 1.8-4.2 cm. long, the peduncle 2.4-9.0 mm. long, the rachis with triangular or suborbicular, basally attached bracts 0.4-0.8 mm. broad; flowers white to lavender, 10-35 and usually distant along the rachis, about 5 mm. long and 4 mm. wide, pedicels 0.4-2.8 mm. long, the perianth parts 2.0-2.8 mm. long, the lobes 0.8-1.4 mm. wide, connate by about 25-50% (0.5-1.3 mm.) of their length, minutely puberulent, the trichomes about 0.1 mm. long; staminal filaments 2.0-3.2 mm. long, the anthers 0.8-1.2 mm. long; pistillode prominent, 0.6-0.8 mm. long. Pistillate inflorescences: racemose, solitary in the axils of leaves or fallen leaves, 9-32 mm. long, elongating in fruit, the peduncles 2-7-11.0 mm. long, minutely puberulent, the rachis with numerous triangular or suborbicular, basally attached bracts; flowers 3-14 and distant along the rachis, pedicels (0.3-)0.8-3.0 mm. long, elongating in fruit, the perianth tube 4-lobed at the apex, narrowly ovoid, 1.2-2.6 mm. long, 0.8-1.5 mm. in diameter, sparsely appressed-puberulent, the vesture greenish becoming cinereous; ovary superior to half-inferior, the style branches 2.0-4.2 mm. long. Fruit globose, about 6-8 mm. in diameter, conspicuously tuberculate, glabrate, the fruiting pedicels 3-14 mm. long.

The consistent correlation of narrow leaves and short racemose inflorescences distinguishes this species which ranges from central Mexico to Guatemala.

Central Mexico to Guatemala, in moist forests at altitudes from 800 to 2600 meters; flowering from May to June and October to December.

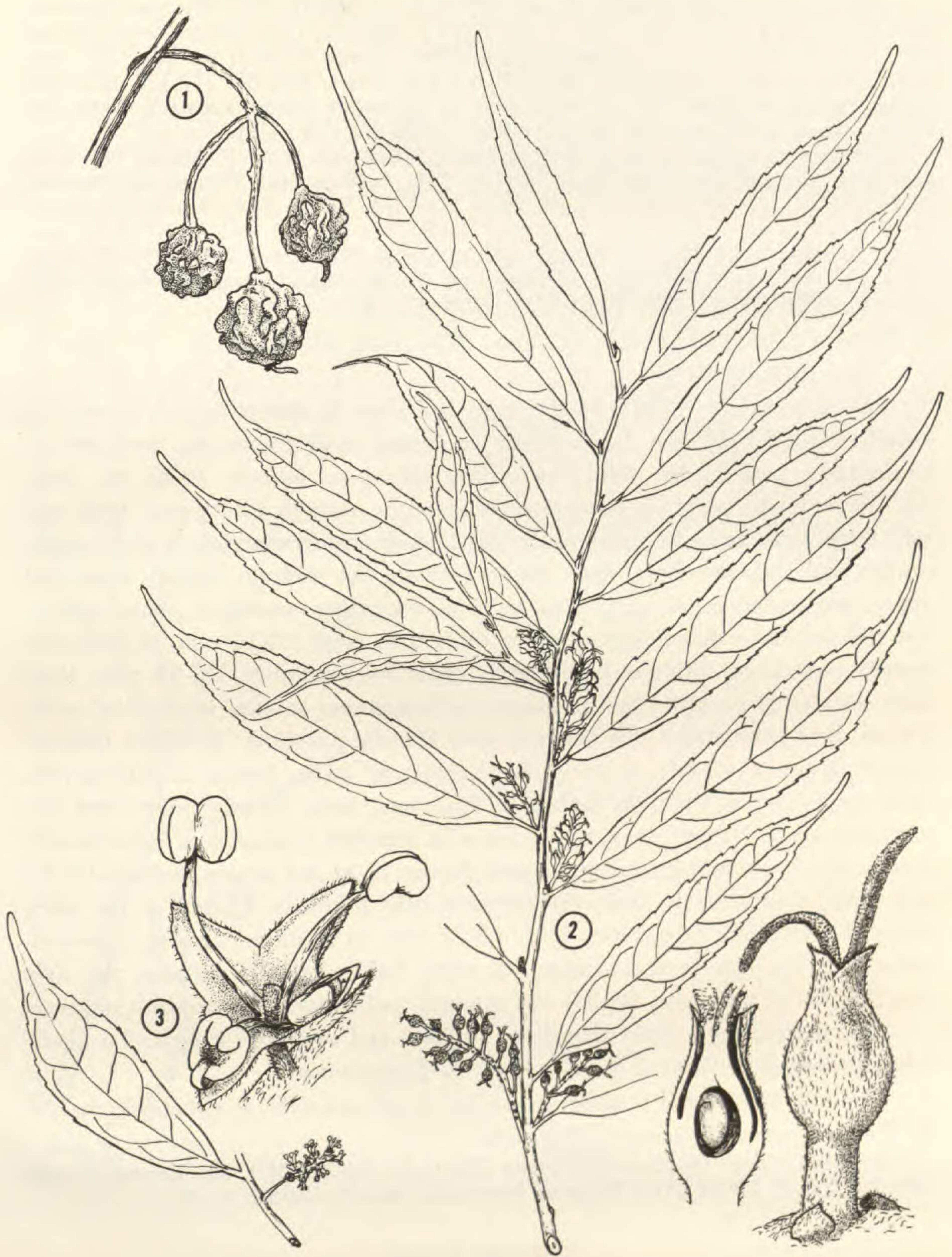


Figure 3. *Trophis chiapensis*: from Matuda 3933 (1: 1.2x), Skutch 1511 (2), and Matuda 4241 (3).

Vernacular name: *Cereza de montaña* (Guatemala-Steyermark).

MEXICO: CHIAPAS: Mt. Ovando, *Matuda* 3933 [(♀) A, MICH, MO, US]; near Escuintla, *Matuda* 4241 [(♂) A, F, MO, US], 15989 [(♂) F, MICH]; Cerro del Boquerón, *Purpus* 7091 [(♀) F, MO, US]. GUERRERO: Montes de Oca, *Hinton* 10298 [(♂) GH, US]. VERA CRUZ: Orizaba, *Botteri* 1014 [(♂) BM, GH, P]; Palo Dulce, *Mell* 685 [(♂) F, NY, US]; Jalapa, *Schiede & Deppe s.n.* [(?) BM, (♂) F]. WITHOUT PRECISE LOCALITY: Sierra San Pedro Nolasco, Talea, *Jurgensen* 941 [(♂) BM]; *Mohr* 465 [(♂) US].

GUATEMALA: QUEZALTENANGO: Volcán Zunil, *Skutch* 925 [(♀) F, MICH, NY, US]; near Santa María de Jesús, *Standley* 84572 [(♀) F, S]; between Finca Pirineos and Patzulín, *Standley* 86808 [(?) F], 86994 [(?) F], 87012 [(♀) F]; Volcán Santa María, *Steyermark* 33636 [(?) F]. SAN MARCOS: Volcán Atitlán, *Skutch* 1511 [(♀) A, BM, F, NY, US]; near Rodeo, *Standley* 68956 [(?) F]. SOLOLÁ: Volcán Atitlán, *Steyermark* 47833 [(?) F], 47349 [(♂) F], 47392 [(?) F, US]. SUCHITEPÉQUEZ: Volcán Santa Clara, *Steyermark* 46630 [(♀) F], 46658 [(?) F], 46687 [(♂) F, S], 46730 [(♀) F].

4. *TROPHIS CUSPIDATA* Lundell, in Amer. Midl. Nat. 19:427. 1938. [T.: *Matuda* 1051 (MICH) (♂)]

Shrubs or trees to 12 m. tall, the trunk to 30 cm. in diameter; leafy branchlets usually stout, 1.8-4.0 mm. in diameter, puberulent and glabrescent, prominently lenticellate. Leaf blades oblong to elliptic-oblong or elliptic, 10-25 cm. long, 3.0-7.7 cm. broad, narrowly caudate-acuminate, the acumen 1.2-3.0 mm. wide and 1.4-2.8 cm. long, acute to obtuse at the base, firmly membranaceous to chartaceous, smooth and glabrous above, short pilose beneath, the midvein slightly impressed above, prominent below with 7-13 pairs of ascending secondary veins arching upward near the entire margin; petiole 10-24 mm. long, 1.0-2.2 mm. in diameter, densely puberulent. Stipules persistent or caducous, lanceolate, 2.5-3.8 mm. long, their scars often conspicuous. Staminate inflorescences: solitary in the leaf axils, 2-4 cm. long (immature), the perianth parts densely hirtellous. Pistillate inflorescences: racemose, solitary in the axils of leaves or fallen leaves, 2.8-8.0(-12) cm. long, elongating in fruit, the peduncles 7-22 mm. long, densely puberulent, the trichomes about 0.2 mm. long, the rachis with scattered triangular or suborbicular, basally attached bracts 0.5-0.9 mm. broad; flowers 12-30 and distant, pedicels 0.8-3.0 mm. long, elongating in fruit, the perianth tube minutely 4-lobed at the apex, ellipsoid to obovoid, 2.0-4.5 mm. long, 1.5-2.6 mm. in diameter, densely appressed-puberulent, ferruginous or becoming so; ovary half-inferior to inferior, the style branches 2.0-3.7 mm. long, densely and minutely puberulent. Mature fruit not seen.

Characterized by a dense tomentum on floral and vegetative parts and a nearly inferior ovary, this species is closely related to *T. mexicana*.

Southern Mexico and probably extending into Guatemala, at altitudes from 2000 to 4000(?) meters; flowering in December.

MEXICO: CHIAPAS: Mt. Ovando, *Matuda* 1051 [(♂) MICH, MO]; Mt. Tacaná, *Matuda* 2370 [(♀) A, F, MICH, NY]; Pinabeto, Motozintla, *Matuda* 15478 [(♀) F].

EXCLUDED SPECIES

Trophis aurantiaca Herzog, in Fedde, Rep. Nov. Spec. 7: 51. 1909.= *Olmedia* sp.

Trophis Hilariana Cazar. Nov. Strip. Bras. Dec. 80. 1845.= *Sorocea guilleminiana* Gaud.

Trophis macrostachya Donn. Sm. in Bot. Gaz. 40: 10. 1905.= *Sorocea pubivena* Hemsl.

All the Old World species proposed for *Trophis* are excluded following Bureau in DC. Prodrum 17:254. 1873.



Figure 4. *Trophis cuspidata*: from Matuda 2370 (1), Matuda 15478 (2), and Matuda 1051 (3).

II. CLARISIA R. & P.

CLARISIA R. & P. Fl. Per. 128. t 28. 1794, nom. conserv., *Clarisia* Abat. [T.: *C. racemosa* R. & P.]

Sahagunia Liebm. in Kon. Danske Vidensk. Selsk. Skr. 5. 2: 316. 1851. [T.: *S. mexicana* Liebm.]

Soaresia, Fr. Allem. in Rev. Brazil. 1: 210: 1857, non *Soaresia* Sch. Bip. [T.: *S. nitida* Fr. Allem.]

Dioecious, laticiferous, unarmed shrubs and trees. Leaves alternate, distichous, bistipulate, pinnately veined, the petioles sulcate above. Stipules lateral, caducous or rarely persistent, their scars encircling less than half the stem. Inflorescences axillary or cauliflorous on the older branchlets; staminate inflorescences spicate with bracts and stamens usually lacking along a narrow line along one or two sides, paired in the axils of leaves or fallen leaves or borne in alternate pairs along a leafless racemiform shoot. Staminate flowers reduced to single stamens arising directly from the rachis, interspersed among numerous bracts, the stamens in well ordered rows or paired but usually irregularly placed, with filaments short and slender, anthers subbasifixed, dehiscing longitudinally. Pistillate flowers pedicellate, with 3-7 suborbicular peltate bracts at the base of the receptacle; perianth tubular, adnate to the inferior ovary; pistil 2-carpellate and 1-locular, the ovule solitary, anatropous and pendulous, the style deeply and narrowly bifid with the stigmatic surface minutely papillate. Fruit drupaceous, the perianth tube accrescent and succulent, the stone ellipsoid, without endosperm, the embryo large with thick equal cotyledons and minute hypocotyl.

Clarisia was revised by Lanjouw in 1936 and many recent collections have been identified according to his revision. The accumulation of new collections with the frequent misplacement of specimens of *Trophis* and *Sorocea* made necessary an examination of material filed under *Clarisia*. In studying this material I have come to conclusions differing from those of Lanjouw though fully cognizant of the contribution his study has made. Lanjouw clarified the nomenclatural problems associated with the name *Clarisia*, which led to the conservation of the genus of Ruiz and Pavón. The major differences between my conclusions and those of Lanjouw are, first, that I have separated the species with capitate pistillate inflorescences as a distinct genus (*Acanthinophyllum*), and secondly, that I interpret *C. biflora* as a polymorphic species of wide distribution. The genus defined in this manner is composed of but two species.

Clarisia presents an interesting sequence in the development of a racemiform inflorescence. The basic condition is probably best illustrated by the pistillate flowers of *C. biflora*. These are usually paired in the axils of leaves but in some specimens they arise in alternating pairs along a shoot that terminates in one to several leaves. In occasional specimens of *C. biflora* the flowering shoots with alternating pairs of flowers are completely leafless [Allen 3741, Weberbauer 7057 (GH)]. The cauliflorous "racemes" of *C. racemosa* with alternating pairs of pistillate flowers or staminate spikes may thus be interpreted as leafless flowering shoots.

The genus extends from central Mexico to Bolivia and eastern Brazil. The trees often reach 30 meters in height and perhaps for this reason are infrequently collected.

KEY TO THE SPECIES

- a. Inflorescences axillary on the leafy branchlets; pistillate flowers in axillary pairs or on short leafless racemiform shoots; leaves with 6-12 pairs of ascending secondary veins. Mexico to Bolivia and the upper Amazon basin1. *C. BIFLORA*
- aa. Inflorescences cauliflorous on the older branchlets; pistillate flowers on long leafless racemiform shoots; leaves with 10-18 pairs of subhorizontal secondary veins. Ecuador to Bolivia and eastern Brazil2. *C. RACEMOSA*

1. *CLARISIA BIFLORA* R. & P. Syst. Veg. Fl. Peruv. et Chil. 255. 1798. [T.: Ruiz & Pavón s.n. in Herb Madrid]

Shrubs or trees to 35 m. tall, the trunk to 1.2 m. in diameter with smooth brown bark, yellowish wood, and milky latex; leafy branchlets 2.0-4.5 mm. in diameter, sparsely appressed-puberulent, the lenticels small and inconspicuous. Leaf blades narrowly oblong, elliptic-oblong or broadly elliptic, 8-25 cm. long, 2.5-9.0 cm. broad, acuminate, acute to obtuse at the base, firmly membranaceous to stiffly chartaceous, glabrous above, glabrous or sparsely puberulent beneath, the midvein slightly impressed above, prominent below with (4-)6-12 pairs of ascending secondary veins arching upward near the entire margin; petiole (4-)6-22 mm. long, 1.0-2.2 mm. in diameter, minutely and sparsely puberulent, glabrescent. Stipules caducous or rarely persisting, narrowly to broadly cuneate, 3.5-7.2 mm. long, their scars inconspicuous. Staminate inflorescences: spicate, paired in the axils of leaves or fallen leaves or in alternate pairs on leafless racemiform shoots, the primary peduncle 5-35 mm. long, minutely puberulent and bracteate only below the attachment of the secondary peduncles (peduncles of the spikes); spikes 2-10 cm. long, secondary peduncles 3-6 mm. long, sparsely puberulent, the rachis with numerous spatulate to broadly cuneate, basifixed or occasionally peltate bracts; stamens interspersed among the bracts, the filaments straight or sometimes bent below the anther, about 1.0 mm. long, anthers 0.4-0.8 mm. long, emarginate in Mexico, slightly apiculate in Central America, or the connective forming a small apical disc in South America. Pistillate flowers in pairs in the axils of leaves or fallen leaves or occasionally in alternate pairs along a leafless racemiform shoot, peduncles to 12 mm. long, the pedicels 0.5-6.0 mm. long, densely and minutely puberulent, with 3-7 peltate bracts 0.6-1.4 mm. broad at the base of the receptacle; perianth tube 2.2-5.0 mm. long, 1.1-5.0 mm. in diameter, narrowly ovoid to globose, glabrous except at the minutely 2-4 or irregularly lobed apex, style branches 2-6 mm. long. Fruit ovoid to ellipsoid, to 25 mm. long, green or yellowish, smooth and glabrous

This species was interpreted as a group of four by Lanjouw in his revision of 1936. I believe that the additional material now available requires a broader circumscription. The leaves are quite variable and isolated collections have given the impression that this variation is correlated with geography. However, plants with narrow elliptic leaves have now been collected in Costa Rica, Colombia, Peru, Bolivia, and Brazil while broadly elliptic leaves were collected by Ruiz and Pavón in Peru and recently in Panama. The variation in inflorescences likewise is not worthy of taxonomic recognition. The same collection, for example, may have solitary or paired staminate spikes in the axils of leaves [Skutch 2004 (US)] or leafless racemiform shoots of alternating pairs of spikes [Skutch 2004 (F)].

The anthers of the only staminate collection from Central American (*Skutch 2004*) possess a slight apical enation that is lacking in specimens from Mexico. I suspect that further collections from Central America will exhibit a transition to the definite disc-like structure of South American specimens. This character of the anthers together with differences in leaf form justifies, I believe, the recognition of two subspecies. The geographical demarcation of these subspecies, however, can only be provisional due to the lack of staminate collections between Guatemala and Colombia.

KEY TO THE SUBSPECIES

- a. Anthers emarginate or with the connective only slightly expanded at the apex of the thecae; pistillate flowers globose at anthesis; pedicels 0.5-3.0 mm. long; leaves narrowly oblong to elliptic-oblong. Mexico and Guatemala1a. ssp. MEXICANA
 aa. Anthers with a definite disc at their apex; pistillate flowers narrowly ovoid to globose at anthesis, pedicels 1-6 mm. long; leaves broadly elliptic to obovate or elliptic oblong. Costa Rica to Brazil and Bolivia1b. ssp. BIFLORA

1a. *CLARISIA BIFLORA* ssp. **mexicana** (Liebm.) W. Burger, comb. & stat. nov.

Sahagunia mexicana Liebm. in Kon. Danske Vidensk. Selsk. 5²: 316. [T.: *Liebmann 14259* (C) (♂)]

Clarisia mexicana (Liebm.) Lanj. in Rec. Trav. Bot. Néerl. 33: 270. 1936.

Leaves narrowly oblong to elliptic-oblong or occasionally narrowly obovate, 8-22 cm. long, 2.5-4.5(-7.0) cm. broad, acuminate, acute to obtuse at the base, the secondary veins similar to the lower leaf surface in pigmentation. Staminate spikes to 4.5 cm. long, the anthers eglandular or with a small projection at the apex. Pistillate pedicels 0.5-3.0 mm. long, the flowers globose at anthesis. Fruit not seen.

Flowering from December through March.

MEXICO: CHIAPAS: Escuintla, *Matuda 4023* [(♂) MICH, MO], *17439* [(♀) F]. VERA CRUZ: Barranca de Tlatetla, E. of Mirador, *Liebmann 14259* [(♂) F]; Consoquitla. *Liebmann 14273* [(♂) F]; Zacuapan, *Purpus 5989* [(♀) US], *6492* [(♂) F, US].

GUATEMALA: QUEZALTENANGO: Colomba, *Skutch 2003* [(♀) BM, F, US], *2004* [(♂) BM, F, US].

1b. *CLARISIA BIFLORA* ssp. BIFLORA

Sahagunia colombiana Rusby, Descr. New Sp. S. Am. Pl. 10. 1920. [T.: *H. H. Smith 424* (NY) (♂)].

Clarisia colombiana (Rusby) Lanj. in Rec. Trav. Bot. Néerl. 33: 266. 1936.

Clarisia mattogrossensis Lanj. loc. cit. 268. 1936. [T.: *Collenette 131* (K) (♂)].

Clarisia panamensis Woods. in Ann. Missouri Bot. Gard. 47: 123. 1960. [T.: *Allen 3741* (MO) (♀)].

Leaves broadly elliptic to obovate or elliptic-oblong, 7-24 cm. long, 3.2-8.5 cm. broad, often abruptly acuminate, obtuse or occasionally acute at the base, the secondary veins often darkly pigmented. Staminate spikes to 8.5 cm. long, the anthers with a conspicuous gland-like disc at their apex. Pistillate pedicels 1-6 mm. long, the flowers narrowly ovoid to globose at anthesis. Fruit ellipsoid to narrowly oblate, becoming yellowish, with thickened style branches.

The differences in stamen size used by Lanjouw to distinguish *C. colombiana* from *C. mattogrossensis* appear to be due to individual variation and stage of development.

Flowering from December to February and June through September at altitudes to 2100 meters.



Figure 5. *Clarisia biflora*. ssp. *mexicana*: from Liebmann 14250 (1). ssp. *biflora* from H. H. Smith 424 (2), Klug 3698 (3), and Weberbauer 7057 (4).

Vernacular names: *Lechero colorado* (Colombia-Garcia-Barriga); *Leche caspi*, *Cuchara caspi* (Peru-Ll. Williams).

COSTA RICA: PUNTARENAS: Palmar Norte de Osa, *Allen* 5955 [(♀) F, US].

PANAMÁ: COCLÉ; N. of El Valle de Antón, *Allen* 3741 [(♀) BM, F, G, MO].

COLOMBIA: CUNDINAMARCA: between San Francisco and Subachoque, *Garcia-Barriga* 11030 [(♂) US]. SANTA MARTA: Don Amo Road, *H. H. Smith* 424 [(♂) F, NY, US]. VALLE DEL CAUCA: Cordillera Occidental, Río Sanguinini, *Cuatrecasas* 15487 [(♀) F], 15493 [(♂) F].

PERU: LIBERTAD: Pataz, below Ongón, *Weberbauer*, 7057 [(♀) F, GH]. LORETO: Caballococha, Amazon River, *Ll. Williams* 2086 [(♀) F]. SAN MARTÍN: Zepelacio, near Moyobama, *Klug* 3698 [(♂) BM, F, GH, MO, NY, S]. Lamas, near Tarapoto, *Ll. Williams* 6471 [(♂) F]. SANTA ROSA: Urubamba Valley, *Cook & Gilbert* 1719 [(♂) F, US]. WITHOUT PRECISE LOCALITY: *Ruiz & Pavón* 24 26 [(♀) F], 24/28 [(♀) F]. from Río Ucayli, cult. in Hort. Belém, Pará, Brazil.

BOLIVIA: LA PAZ: S Yungas, San Bartolomé, *Krukoff* 10410 [(♀) F, LIL, MO, S], Larecaja, Tuirí, *Krukoff* 10728 [(♀) A, F, LIL, MO, S], 10813 [(♂) F, LIL, MO].

BRAZIL: ACRE: São Paulo, *Lewin* 2076/w17 [(?) LIL]. MATTO GROSSO: Tombador, on Rio Serragem, *Collenette* 131 [(♂) NY]. PARÁ: in Hort. Belém.

2. *CLARISIA RACEMOSA* R. & P. *Syst. Veg. F. Peruv. et Chil.* 255. 1798 [T.: *Ruiz & Pavón s.n.*, Chinchao et Pozuzo, in Herb Madrid.]

Soaresia nitida Fr. *Allem. in Rev. Brazil* 1: 210, *cum tab.* 1857; *Arch. Palestr. Scient. Rio Jan.* 1: 142. 1858. *ex ic.*

Olmedia erythrorhiza Huber, *nom. ex Ducke in Arch. Jard. Bot. Rio Jan.* 3: 40. 1922, *pro syn.*

Clarisia nitida (Fr. *Allem.*) *Macbr. in Field Mus. Pub. Bot.* 11: 15. 1931.

Trees to 40 m. tall, the trunks slender with rough brown bark, yellowish wood, and white latex; leafy branchlets 1.5-3.7 mm. in diameter, minutely puberulent, the lenticels small and inconspicuous. Leaf blades narrowly to broadly oblong or ovate, (4-)6-17 cm. long, (2.0-)3.5-7.0 cm. broad, acuminate, the base often rounded, subtruncate to obtuse or occasionally acute, thickly chartaceous to subcoriaceous, often lustrous above, glabrous, the midvein slightly impressed above, prominent below with 10-18 pairs of subhorizontal secondary veins, the margin entire or slightly undulate; petiole 4-16 mm. long, 0.7-1.8 mm. in diameter, sparsely puberulent and glabrescent. Stipules caducous or rarely persistent, broadly cuneate, 1.2-2.0 mm. long, their scars small and inconspicuous. Staminate inflorescences: cauliflorous, solitary or several arising together from the older branchlets, usually of alternate pairs of spikes along a leafless racemiform shoot, 6-15 cm. long, the primary peduncle 5-43 mm. long, minutely puberulent or glabrescent, the primary rachis bracteate only below the attachment of the secondary peduncles (peduncles of the spikes); spikes 2-9 cm. long, secondary peduncles 2-10 mm. long, densely and minutely puberulent, the rachis of the spike with numerous spatulate to broadly cuneate, basifixed or occasionally peltate bracts; stamens interspersed among the bracts, the filaments about 1.0 mm. long, anthers about 0.5 mm. long, emarginate. Pistillate inflorescences: racemiform, cauliflorous on the leafless branchlets or rarely in the axils of leaves, solitary to several arising together, 6-14 cm. long (to 25 cm. in fruit), the 10-24 flowers usually borne in alternate pairs along a leafless racemiform shoot (inflorescence); peduncle 12-35 mm. long, the rachis glabrescent and bracteate only below the attachments of the pedicels; pedicels 2.4-4.5 mm. long (to 20 cm. in fruit), densely and minutely puberulent, occasionally with a bract

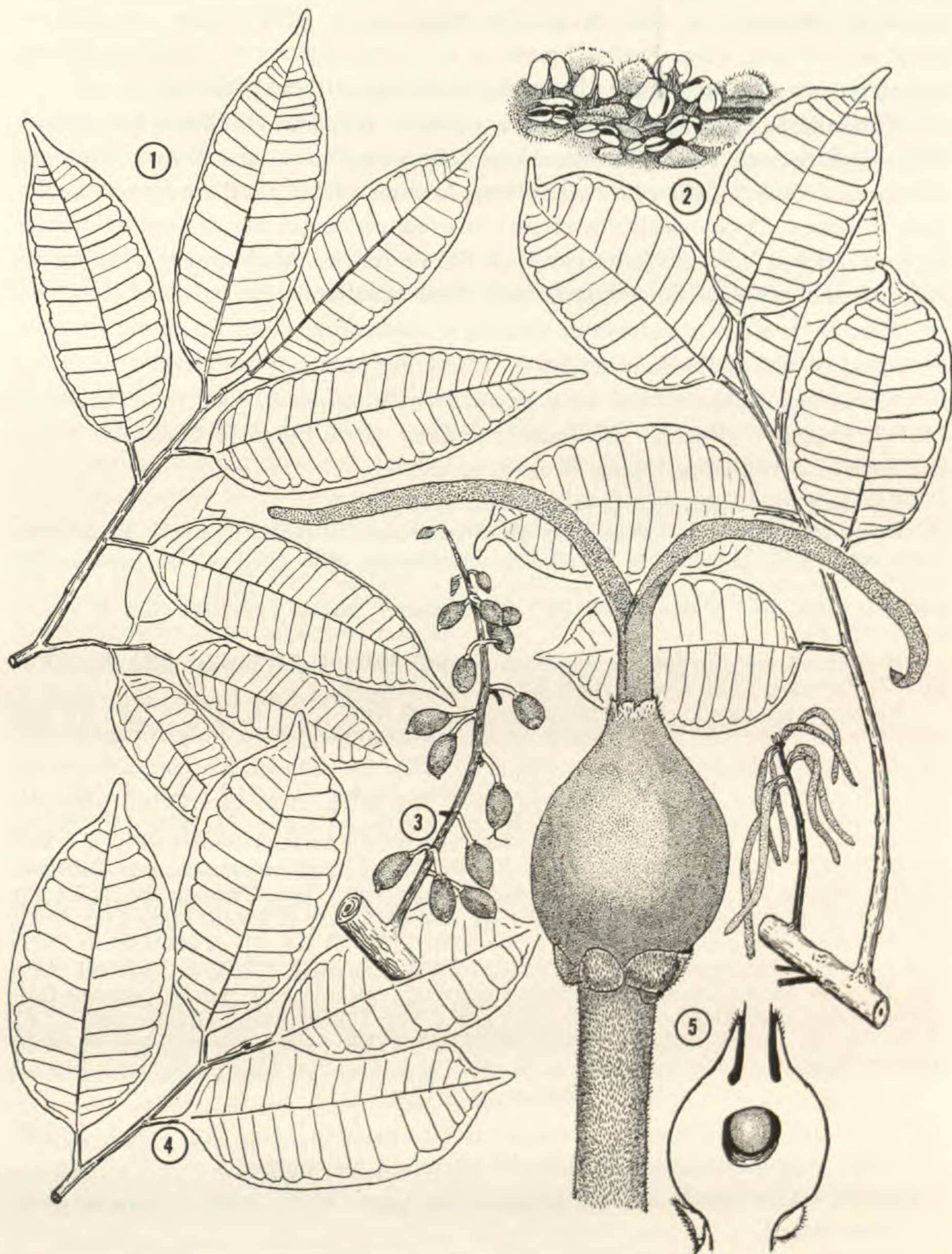


Figure 6. *Clarisia racemosa*: from Ducke (30/VI/1942) 948 (1), Ducke (26/X/1935) 59 (2), Krukoff 5380 (3), Krukoff 10744 (4), and Krukoff 8312 (5).

or two along their length, with 3-5 suborbicular peltate bracts 0.7-1.5 mm. broad at the base of the receptacle; perianth tube narrowly to broadly ovoid, glabrous but appressed-puberulent at the irregularly lobed apex, 3.5-8.0 mm. long; style branches 5-10 mm. long. Fruit ellipsoid or somewhat asymmetric, to 35 mm. long and 14 mm. in diameter, orange becoming black, smooth and glabrous.

The inflorescences show little of the variation found in *C. biflora* and apparently have become stabilized. An interesting exception is the British Museum specimen of *Krukoff 1450* with two solitary, long-pedicelled pistillate flowers in the axils of leaves. Other specimens of the same collection possess the normal cauliflorous "racemes." The disjunct plants of Rio de Janeiro exhibit no morphological distinctions that might be correlated with their isolation.

Ecuador to Bolivia and eastern Brazil; in moist forests and the *matta de terra firme* and *várzeas* of the Amazon basin. Flowering from July to January.

Vernacular names: *Moral babo*, *Moral comida de mono*, *sota*, *zota* (Ecuador-Little); *Capinuri* (Peru-Ll. Williams); *Tulpay* (Peru-Burgos); *Guariuba* (Peru and Brazil-Ll. Williams, Ducke, Krukoff, et al.).

ECUADOR: ESMERALDAS: near Quininde, *Little 6219* [(?) F].

PERU: HUÁNUCO: Km. 142 Huánuco-Pucallpa, *Burgos 59* [(?) F]. JUNÍN: La Merced, *Weberbauer 1912* [(♀ ♂) F]; Río Negro, *Woytkowski 5865* [(♀) MO]. LORETO: R'ío Ucayli, *Tessmann 5433* [(♂) S]; La Victoria, *Ll. Williams 2684* [(?) F], *3079* [(?) F]; Alto Río Itaya, *Ll. Williams 3380* [(?) F]. WITHOUT PRECISE LOCALITY: *Ruiz & Pavón 24/24* [(?) F].

BOLIVIA: LA PAZ: S. Yungas, Río Bopi, *Krukoff 10533* [(♂) F, LIL, MO, S], *10679* [(?) F]; Larecaja, Tuirí, *Krukoff 10744* [(?) F, LIL, MO, S].

BRAZIL: ACRE: mouth of Rio Macauhan, *Krukoff 5380* [(♀) A, BM, F, MO S]; Rio Acre, *Ule 9317* [(♂) MG]. AMAZONAS: Manáus, *Ducke (26/X/1935) 59* [(♂) A, F, MO, RB, S]; basin of Rio Solimões, *Froes 132* [(♀) LIL]; São Gabriel, Rio Negro, *Froes 410* [(?) LIL], *852* [(?) LIL]; mouth of Rio Embira, *Krukoff 5173* [(♀) BM, F, MO, S]; Humayata, near Tres Casas, *Krukoff 6327* [(♀) BM, LIL, MO, S]; near Livramento, *Krukoff 6628* [(♀) A, BM, F, MO, S]; São Paulo de Olivença, *Krukoff 8312* [(♀) BM, F, MICH, MO, RB, S], *8666* [(♀) BM, F, MICH, P, S]. MATTO GROSSO: near Tabajara, *Krukoff 1450* [(♀) A, BM, MO, S]. PARÁ: Tapajos, Bôa Vista, *Capucho 568* [(♀) F]; Faro, *Ducke (2/I/1920) 13051* [(♀) RB, S]; Gurupá, *Ducke (14/VIII/1918)* [(?) MG]; Rio Rapajoz, São Luiz, *Ducke (4/XII/1919) 13052* [(♀) P, RB, S], *(14/XII/1919) 13052* [(♂) S]; Rio Trombetas, *Ducke (18/II/1918) 16993* [(?) MG], *(25/X/1919) 13054* [(♂) RB, SS]; Rio Xingú, *Ducke (14/X/1916) 16606* [(♂) MG, P, RB]. RIO DE JANEIRO: Corcovado, *Glaziou 20489* [B (♀ ♂), C (♀ ♂), P (♂)]; Cosmo Velho, *Glaziou 8289* [(♀) F, P]; Rio de Janeiro, *Kuhlmann (VIII/1920) 13055* [RB (♀ ♂), S (♂)], *(19/IX/1920) 13055* [(♀) S].

EXCLUDED SPECIES

Clarisia ilicifolia (Spreng.)—Lanj. & Rossb. in *Rec. Trav. Bot. Néerl.* 33:717. 1936. = *Acanthinophyllum ilicifolia* (Spreng.) W. Burger.

Clarisia mollis Standl. in *Ann. Missouri Bot. Gard.* 30:85. 1943. = *Sorocea pubivena* Hemsl.

Clarisia spruceana Lanj. in *Rec. Trav. Bot. Néerl.* 33:272. 1936. = *Acanthinophyllum spruceana* (Lanj.) W. Burger.

Clarisia strepitans (Fr. Allem.) Lanj. in *Rec. Trav. Bot. Néerl.* 33:272. 1936. = *Acanthinophyllum ilicifolia* (Spreng.) W. Burger.

Clarisia urophylla (Donn. Sm.) Lanj. loc. cit. 270. 1936. = *Trophis racemosa* (L.) Urb.

III. ACANTHINOPHYLLUM Fr. Allem

ACANTHINOPHYLLUM Fr. Allem. in Rev. Brazil. 1:368, 1858; Arch. Palestr. Scient. Rio Jan. 1:215. 1858. [T.: *A. strepitans* Fr. Allem., = *A. ilicifolia* (Spreng.) W. Burger]

Dioecious, laticiferous, unarmed shrubs and small trees. Leaves alternate, distichous, bistipulate, pinnately veined, the petioles sulcate above. Stipules lateral, caducous or persistent, their scars encircling less than half the stem. Inflorescences axillary or cauliflorous on the leafless branchlets, solitary or several clustered on leafless brachyblasts or rarely the staminate alternate along a short leafless racemiform shoot, the staminate spicate with the bracts and stamens lacking along a narrow strip along one side, the pistillate capitate; peduncles densely invested with minute retrorse uncinata trichomes. Staminate flowers reduced to single stamens arising directly from the rachis and interspersed among numerous variously shaped bracts, occasionally in groups of 2-4; filaments short and slender, the anthers small and usually dorsifixed, dehiscing longitudinally. Pistillate flowers sessile on a short peduncled capitulum; perianth tubular, free or partially adnate to the superior or subinferior ovary; pistil 2-carpellate, 1-locular, the ovule solitary, pendulous, and anatropous, the style shortly bifid with the inner stigmatic surface glabrous. Fruit drupaceous, the perianth tube accrescent and succulent, the stone globose to ellipsoid, without endosperm, the embryo large, straight, and erect with thick, usually equal cotyledons, the hypocotyl minute.

The genus ranges from British Guiana to eastern Brazil and the Amazon basin of Venezuela, Brazil, and Bolivia.

Acanthinophyllum is characterized by its staminate flowers reduced to single stamens and its pistillate flowers borne on a short peduncled capitulum. Liebmann described *Sahagunia* from staminate plants he had collected in Mexico. When Bentham and Hooker (1880) described the pistillate flowers of the genus *Sahagunia* they unfortunately drew their details from specimens of *Acanthinophyllum*, which is restricted to South America. The staminate spikes of *Acanthinophyllum* resemble those of *Sahagunia* but the dorsifixed anthers and pistillate capitula readily distinguish the two genera. The retrorse uncinata trichomes present on leaves, twigs, and especially peduncles of *Acanthinophyllum* are not found in *Clarisia* (an earlier name for *Sahagunia*). In addition to the trichomes the midvein of the leaves is prominulous above and the epidermal cells have a deeply sinuate outline. These vegetative characters are shared, to my knowledge, only by *Trymatococcus* and *Helianthostylis* among South American Moraceae. The genus is represented by two species.

KEY TO THE SPECIES

- a. Staminate spikes condensed, to 2.0 cm. long; pistillate inflorescences of 8-15 closely contiguous flowers; leaves spinulose-serrate to entire. British Guiana to Brazil and Bolivia1. *A. ILICIFOLIA*
 aa. Staminate spikes lax, to 6.5 cm. long; pistillate flowers not seen; leaves entire. Venezuela: Amazonas2. *A. SPRUCEANA*

1. ACANTHINOPHYLLUM **ilicifolia** (Spreng.) W. Burger, comb. nov.

Excoecaria ilicifolia Spreng. Neue Entdeck. 2: 117. 1821. [T.: Without Collector, "in Brasilia," in Herb. Berlin, (♂)]

- Acanthinophyllum strepitans* Fr. Allem. in Rev. Brazil. 1: 36, cum tab. 1858; and in Arch. da Palestr. Scient. Rio Jan. 1: 215. 1858. *ex ic.*
- Pseudosorocea Poeppigii* Baill. in Adansonia 11: 297. 1875.
- Sahagunia strepitans* (Fr. Allem.) Benth. & Hook. Gen. Pl. 3: 377. 1889.
- Sahagunia racemifera* Huber, in Bol. Mus. Para. 5: 334. 1908. [T.: Ducke (27/VII/1902) 2885 (MG) (♂)]
- Sorocea stenophylla* Standl. in Trop. Woods no. 43: 18. 1935. [T.: Capucho 447 (F) (♀)]
- Clarisia strepitans* (Fr. Allem.) Lanj. in Rec. Trav. Bot. Néerl. 33: 274. 1936.
- Clarisia strepitans* var. *guianensis* Lanj. loc. cit. 274. 1936. [T.: Stahel 120 (U) [(♀)]
- Clarisia strepitans* var. *paraensis* Lanj. loc. cit. 275. 1936. [T.: Huber 6965 (U) (♀)]
- Clarisia strepitans* var. *micranthera* Lanj. loc. cit. 275. 1936. [T.: Glaziou 12172 (K) (♂)]
- Clarisia strepitans* var. *cuyunensis* Lanj. loc. cit. 275. 1936. [T.: Forest Dept. 1029 (U) (♂)]
- Clarisia ilicifolia* (Spreng.) Lanj. & Rosseb. loc. cit. 717. 1936.
- Clarisia ilicifolia* var. *guianensis* (Lanj.) Lanj. & Rosseb. loc. cit. 718. 1936.
- Clarisia ilicifolia* var. *paraensis* (Lanj.) Lanj. & Rosseb. loc. cit. 1936.
- Clarisia ilicifolia* var. *micranthera* (Lanj.) Lanj. & Rosseb. loc. cit. 718. 1936.
- Clarisia ilicifolia* var. *cuyunensis* (Lanj.) Lanj. & Rosseb. loc. cit. 718. 1936.

Shrubs or small trees to 8(-15) m. tall with white or yellowish latex; leafy branchlets sparsely invested with small retrorse uncinatate trichomes, glabrescent, the lenticels small and inconspicuous. Leaf blades elliptic to elliptic-oblong, obovate or occasionally linear-lanceolate, 3-25 cm. long, 1.7-7.0(-9.0) cm. broad, acuminate to abruptly caudate-acuminate, the apex acute, acute to obtuse at the base, chartaceous to pergamentaceous, glabrous, the midvein prominulous above, prominent below with 6-14 pairs of ascending secondary veins arching upward near the spinulose-serrate to entire or occasionally deeply sinuate margin; petiole 5-17 mm. long, 0.7-2.5 mm. in diameter, glabrescent or sparsely invested with retrorse uncinatate trichomes. Stipules caducous or persistent narrowly lanceolate, 1.0-1.8 mm. long their scars small and inconspicuous. Staminate inflorescences: spicate, axillary or cauliflorous on the older branchlets, paired, solitary, or clustered on leafless brachyblasts or rarely on leafless racemiform shoots, 4-20 mm. long; peduncles 2-5 mm. long, densely invested with small retrorse uncinatate trichomes, the rachis with numerous cuneate to suborbicular, basally attached or occasionally peltate bracts; stamens interspersed among the bracts, the filaments about 1 mm. long, the anthers 0.2-0.3 mm. long, occasionally paired or rarely in threes. Pistillate inflorescences: capitula of 8-15 closely contiguous flowers, solitary, paired or clustered on leafless brachyblasts in axils of leaves or cauliflorous, 10-18 mm. long at anthesis; peduncles 3-9 mm. long, densely invested with retrorse uncinatate trichomes about 0.1 mm. long; flowers occasionally subtended by basally attached bracts, elliptic to obovoid or variously shaped by contact with adjacent flowers, sessile, the perianth tube 1.2-3.0 mm. long, 1.0-3.0 mm. in diameter, minutely hispidulous, the ovary superior to subinferior, tapering to the slender style, style branches broad, about 1-2 mm. long, glabrous. Fruit globose or ellipsoid, to 25 mm. long and 15 mm. in diameter, smooth and glabrous, orange at maturity.

The leaves of this species are extremely variable, ranging from broadly elliptic to linear-lanceolate and from spinulose-serrate to entire. This variability is found

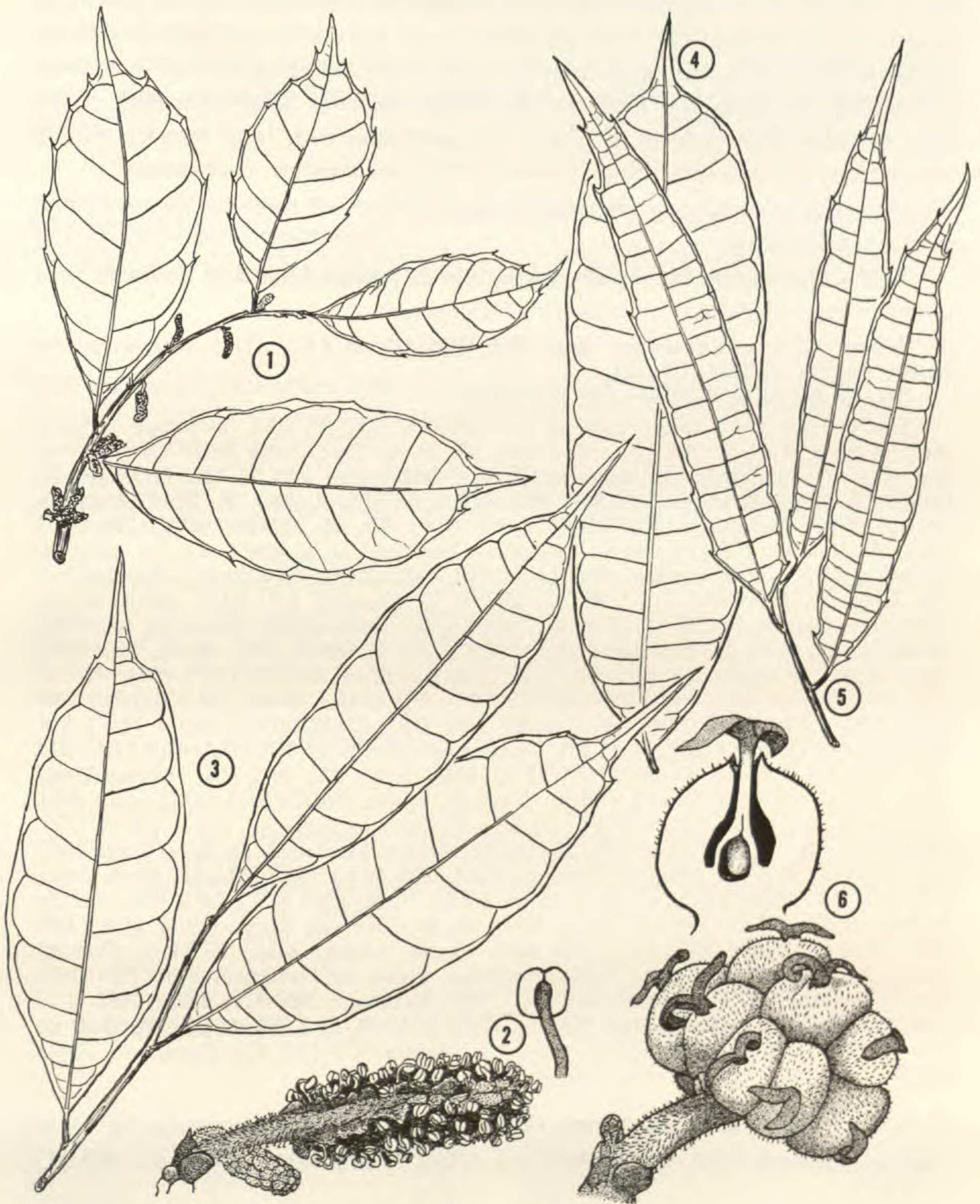


Figure 7. *Acanthinophyllum ilicifolia*: from Ducke (2/IX 1923) 18326 (1 & 2: stamen X20), Krukoff 1669 (3), Krukoff 5991 (4), and Capucho 447 (5 & 6).

throughout the range of the species except for the very narrow-leaved specimens which have only been collected in Pará. Standley's *Sorocea stenophylla* (Plate 7, fig. 5) is based on a collection with linear-lanceolate leaves and may be worthy of varietal status. Collections from Amazonas have more ellipsoid fruit and fewer spinulose leaves than specimens from Pará, but these characters are too inconstant to establish subspecies and I am not describing categories below that rank. Lanjouw described four varieties of which var. *guianensis* with large broadly elliptic leaves appears to be most distinct; however I have not seen var. *cuyunensis*.

Flowering from June to December in moist forest and the *mata de terra firme* of the Amazon basin.

Vernacular names: *Bainha de espada* (Rio de Janeiro-Allemão); *Folha de serra* (Minas Gerais-Magalhães); *Janita* (Pará-Ducke).

FRENCH GUIANA: Karoumany, Sagot 530 [BM (?), P (♂), (?)]; Without precise locality, Poiteau s.n. 1844 [(♂) B].

BOLIVIA: Río Serra, Kuhlmann 571 [(♀) RB].

BRAZIL: ACRE: Rio Abunan, Kuhlmann (21/X/1923) 675 [(?) RB]. AMAZONAS: Calama, Madeira River, Krukoff 1309 [(♀) BM, MO, NY, P, S]; Borba, near Bella Vista, Krukoff 5991 [(?) S]; Manicoré, near Santa Fé, Krukoff 6049 [(♀) BM, F, LIL, MO, NY, S]; Humayata, near Livramento, Krukoff 6849 [(♀) A, BM, F, MO, P, S]; Democracia, Madeira River, Kuhlmann (31/VIII/1923) 257 [(♂) RB, S], (31/VIII/1923) 284 [(♀) RB]; Maués, Pires 118 [(♀) NY]; Santarém, Ginzburger et al. 854 [(♀) F]. GUAPORÉ: Jatuarana River source, Krukoff 1669 [(♀) BM, MO, P, S]. MARANHÃO: Maracassumé, Bôa Esperança, Froes 1869 [(♂) BM, F, MO, P, S], Moses 65 [(?) BM]. MATTO GROSSO: Ouro Preto, Kuhlmann (20/IX/1923) 487 [(♀) RB]. MINAS GERAIS: Campo de Cimentes, Magalhães 843 [(♀) US]; Barbado, Mexia 5158 [(♂) A, BM, F, GH, MICH, MO, NY]; Lagôa Santa, Warming s.n. [(?) S]. PARÁ: Belterra, Black 47-1715 [(♀) NY], 47-1728 [(?) NY]; Tapajos, Bôa Vista, Capucho 447 [(♀) F]; Obidos, Ducke (29/VII/1902) 2885 [(♂) MG, RB], (23/XII/1907) 9190 [(♀) MG, RB], (28/XII/1913) 15270 [(♀) BM, MG, RB], (13/IX/1926) 19473 [(♂) RB, S]; Alemquer, Ducke (26/XII/1903) 4899 [(♂) BM, MG, RB]; Rio Cuminá, Ducke (13/X/1913) 14978 [(♂) BM, MG, RB]; Monte Alegre, Ducke (24/IV/1916) 16059 [(♂) MG]; Bragança, Ducke (10/II/1923) 18323 [(♀) RB]; Rio Tapajoz, (22/VIII/1923) 18324 [(♂) RB, S]; Serra de Santarém, Ducke (2/IX/1923) 18325 [(♂) RB], 18326 [(♂) RB, S]; Belém, Bosque Municipal, Ducke (10/VII/1945) 1726 [(♂) A, F, MG]; Manáus, Francisco-INPA 2025 [(♂) MG]; Moema, Herb. Amaz. 9572 [(?) MG, RB]; Belém do Pará, Santa Izabal, Huber 6894 [(♀) MG, RB]; without definite locality. Huber 6965 [(♀) S]; Trav. Barão d'Mamoré, Signiera 3657 [(♂) MG, RB]; Ourém, Signiera 4022 [(♂) BM, RB]. RIO DE JANEIRO: matas do Horto Florestal, Duarte & Pereira 01574 [(♀) RB]; Corcovado, Ducke & Kuhlmann 6153 [(?) RB]; Trapicheira, Ducke & Kuhlmann 19697 [(?) RB], Kuhlmann 1906 [(?) RB], 19292 [(♀) RB]; entre Mendanha et Realengo, Glaziou 12172 [(♂) B, C, F, P]; S. José, Peckholt s.n. Nov '86 [(♀) B]. WITHOUT PRECISE LOCALITY: Glaziou 1470 [(?) C]; Castelnovo, Riedel s.n. Sept. 1822 [(?) US]; Sello s.n. 1815-1817 (♂) BM].

2. ACANTHINOPHYLLUM *spruceana* (Lanj.) W. Burger, comb. nov.

Clarisia Spruceana Lanj. in Rec. Trav. Bot. Néerl. 33: 272. 1936. [T.: Spruce 3279 (K) (♂)]

Small trees with slender glabrescent branchlets, the lenticels small and inconspicuous. Leaf blades oblong to elliptic-oblong, 8-17(-21) cm. long, 3.2-6.7 cm. broad, acuminate, acute to slightly rounded at the base, chartaceous to pergamentaceous, glabrous, the midvein prominulous above, prominent below with 7-13 pairs of ascending secondary veins arching upward near the entire margin to form an arcuate marginal vein; petiole 8-12 mm. long, 1.2-1.7 mm. in diameter, glabrescent

and rugose. Stipules caducous, their scars small and inconspicuous. Staminate inflorescences: spicate, 2-4 clustered leafless brachyblasts, 2.0-6.5 cm. long; peduncle 4-10 mm. long, densely invested with retrorse uncinat trichomes, the rachis with numerous cuneate to suborbicular, basally attached or subpeltate bracts; stamens interspersed among the bracts or in groups of 2-4, the filaments about 1 mm. long, somewhat flattened, anthers 0.2-0.3 mm. long. Pistillate flowers not seen.

A. spruceana is quite distinct though represented solely by Spruce's original collection. The isotype in the British Museum does not possess the rounded leaf base of the original description.

VENEZUELA: AMAZONAS: ad flumina Casiquieri, Vasiva et Pacimoni, Spruce 3279 [(♂) BM].

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ENUMERATION OF THE GENERA AND SPECIES

I. TROPHIS

1. *racemosa* (L.) Urb.
 - 1a. ssp. **meridionalis** (Bur.)
W. Burger
 - 1b. ssp. **ramon** (Schlecht. & Cham.) W. Burger
 - 1c. ssp. *racemosa*
2. *mexicana* (Liebm.) Bur.
3. *chiapensis* Brandeg.
4. *cuspidata* Lundell

II. CLARISIA

1. *biflora* R. & P.
 - 1a. ssp. **mexicana** (Liebm.)
W. Burger
 - 1b. ssp. *biflora*
2. *racemosa* R. & P.

III. ACANTHINOPHYLLUM

1. **ilicifolia** (Spreng.) W. Burger
2. **spruceana** (Lanj.) W. Burger

INDEX TO COMMON NAMES

<i>Bainha de espada</i>	III 1	<i>Lechero colorado</i>	II 1b
Breadnut	II 1b	<i>Marfil</i>	I 1a
<i>Capinuri</i>	II 2	<i>Moral babo</i>	II 2
<i>Capomillo</i>	I 1b	<i>Moral comida de mono</i>	II 2
<i>Cereza de montaña</i>	I 3	<i>Ojoche macho</i>	I 1b
<i>Cha cox</i>	I 1b	<i>Ojushte</i>	I 1b
<i>Cuchara caspi</i>	II 1b	<i>Ramón</i>	I 1b
<i>Folha de serra</i>	III 1	<i>Ramón blanca</i>	I 2
<i>Guariuba</i>	II 2	<i>Ramón colorado</i>	I 1b
<i>Hoja tinta</i>	I 1b	<i>Ramón de bestia</i>	I 1b
<i>Janita</i>	III 1	<i>Ramoon</i>	I 1b
<i>Leche caspi</i>	II 1b	<i>Raspa-lengua</i>	I 2

<i>Sota</i>	II 2	<i>Ushi</i>	I 1b
Sweet Breadnut	I 2	<i>Uspai-manchinga</i>	I 1a
<i>Tillo prieto</i>	IV 7	White ramon	I 1b
<i>Tulpay</i>	II 2	<i>Yaxox</i>	I 1b
<i>Ujushte</i>	I 1b	<i>Zota</i>	II 2

INDEX TO EXSICCATAE

Italicized numerals refer to collectors' numbers, *s.n.* (*sine numero*) to unnumbered collections; parenthetical numerals refer to the numerals of taxa conserved in this revision: the Roman to genera, and the Arabic to species; lower case letters refer to subspecies.

- Allen, P. H. 3741, 5955 (II 1b).
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